



Economic Commission for Europe

Executive Committee

Centre for Trade Facilitation and Electronic Business**Twenty-eighth session**

Geneva, 10-11 (am) October 2022

Item 5 (b) of the provisional agenda

Recommendations and standards:**Deliverables in support of sustainable development and circular economy
as the outcomes of the sixty-ninth session of the Economic Commission for Europe****Enhancing Traceability of Products along International
Value Chains for the Circular Economy and Sustainable Use
of Resources****Submitted by the secretariat***Summary*

At the 69th UNECE session, member States asked the secretariat to explore approaches to advance the circular transition across different areas, in the region and beyond. As part of the response to this request, the Economic Cooperation and Trade Division is implementing a United Nations Development Account project called “Accelerating the transition towards a circular economy and sustainable use of natural resources in the UNECE region” (2021–2024), in partnership with the UN Environment Programme. The project aims to support the design and implementation of national policies, programmes and strategies in key areas of intervention for the circular economy relating to waste management, public procurement, innovation, trade and traceability of value chains.

The traceability of value chains is the ability to identify and trace the history, distribution, location and use of products, parts and materials. It can help value chain actors respond to the growing demand for data on the sustainability performance of products, processes and organizations, to establish the credibility of sustainability claims, including regarding circularity aspects. This draft policy brief report discusses the state of play of the supporting policy and regulatory framework, along with good practices and ongoing initiatives. It is also to identify a set of policy options for consideration by policymakers, through multi-stakeholder consultation. The paper is planned to be finalized for the UNECE 70th session in April 2023.

Document ECE/TRADE/C/CEFACT/2022/8 in the draft form is submitted to the twenty-eighth session by the secretariat for information.



Part I: Executive Summary

I. Background

1. At the 69th ECE session, member States asked the secretariat to explore approaches to advance the circular transition across different areas, in the region and beyond. As part of the response to this request, the Economic Cooperation and Trade Division is implementing a United Nations Development Account project called “Accelerating the transition towards a circular economy and sustainable use of natural resources in the ECE region” (2021–2024), in partnership with the UN Environment Programme. The project aims to support the design and implementation of national policies, programmes and strategies in key areas of intervention for the circular economy relating to waste management, public procurement, innovation, trade and traceability of value chains.

2. The traceability of value chains is the ability to identify and trace the history, distribution, location and use of products, parts and materials. It is the key to product life-cycle analysis and circular business models. Verifiable information collected and exchanged among value chain actors can help them reduce the use of new resources, reuse products and parts, recycle waste and develop circular product design. Traceability can help value chain actors respond to the growing demand for data on the sustainability performance of products, processes and organizations, to establish the credibility of sustainability claims, including regarding circularity aspects.

3. The project envisages a policy paper entitled “Enhancing traceability of products along international value chains for the circular economy and sustainable use of resources”. The paper is to discuss the state of play of the supporting policy and regulatory framework, along with good practices and ongoing initiatives. It is also to identify a set of policy options for consideration by policymakers, through multi-stakeholder consultation.

4. A preliminary draft of the policy paper is to be submitted for discussion at the second session of the Team of Specialists on Environmental, Social and Governance (ESG) Traceability of Sustainable Value Chains in the Circular Economy and for information at the 28th Plenary of the United Nations Centre for Trade Facilitation and e-Business (UN/CEFACT), under document number ECE/TRADE/CEFACT/2022/8. Over the past weeks, the paper has undergone an extensive peer review process involving a large community of stakeholders, and it is planned to be finalized for the ECE 70th session in April 2023. Delegations are invited to provide a final round of inputs in the context of the Team of Specialists session and the UN/CEFACT Plenary.

II. Key findings and policy instruments

5. In the ECE region, agrifood, garments and footwear, and minerals are among the strategically important sectors that have great potential for the circular transition. To harness the potential of these three sectors in attaining the SDGs there is a need to limit the use of the current linear economy model. Extensive science-based evidence shows that the linear model is causing negative environmental, social and health-related externalities. It is driving, and it is driven by, a continuously growing demand to consume new products. It is compounded by the increasing complexity of value chains, including in these so-called sustainability hotspot sectors. Traceability of value chains can accelerate the circular transition in the complex production processes of industrial goods and materials for these priority sectors.

6. The review conducted for the draft paper found that in the ECE region, progress in advancing traceability of value chains for the circular transition is diverse. On the one hand, the EU sub-region and several of its member States have made impressive headway in improving corporate transparency by introducing rules on conducting and reporting human rights and environmental due diligence across value chains. Current work on the establishment of digital product passports is an example in point. On the other hand, most transition economies have not yet fully embarked on establishing transparency and traceability frameworks. Traceability approaches in Albania and Serbia (e.g. traceability in

agri-food value chains) and in Uzbekistan (traceability in certain high-value textiles products) are examples in point.

7. The draft policy paper also reviews private sector best practices. The preliminary review suggests that many due diligence and traceability rules at the international, regional and national levels are voluntary. At the same time, movements to achieve sustainable and responsible corporate practices in connection with human rights and environmental standards, and their transparency, are becoming more visible.

8. Governments play a leading role in establishing an enabling environment for progress towards the circular transition, by developing effective policy measures to foster traceability for circularity and supporting their broad uptake. This work involves leveraging the full potential of innovation and advanced technologies, such as blockchain, artificial intelligence and the internet of things, as key mechanisms to improve connectivity among value chain actors. Advanced technologies can indeed allow real-time identification and tracking of products and their components across their entire life cycles, and into their second and subsequent lives.

9. Considering the heterogeneity in pace of socioeconomic development, income level and sectoral composition among ECE member States, policy responses need to respond to the different national contexts and the sector in question. Policy responses also need to take into account the need for targeted support to countries with economies in transition, micro, small and medium enterprises (MSMEs) and vulnerable groups, to ensure that supply chain transparency and traceability requirements do not turn into barriers to trade, but instead enable transition economies, MSMEs and vulnerable groups to harness the potential of the circular transition.

10. ECE offers a series of policy tools that can help foster or enhance traceability in value chains for circularity in the three identified hotspot sectors:

1. Garments and footwear

- ECE Recommendation No. 46, with guidelines and a call to action for governments, companies, decisionmakers and policymakers, can help to facilitate the exchange of good practices and lessons learned; and
- The Business and Data Model developed by ECE and UN/CEFACT for the standardized definition and exchange of traceability and sustainability information and their implementation through UNECE blockchain pilots can help to establish full traceability of finished textile and leather products from field to shelf.

2. Minerals

- The United Nations Resource Management System, developed by ECE as a voluntary global standard applicable to all natural resources, presents a comprehensive toolkit that can help to ensure that natural resources are managed in a sustainable and integrated manner;
- The ECE Resources as a Service tool provides stakeholders with options, checklists and guidelines that can help them to implement the circular transition; and
- The United Nations Framework Classification for Resources, developed by ECE, is a global classification and management system applicable to mineral, petroleum, nuclear fuel, renewable energy and anthropogenic resources, as well as water resources and injection projects for geological storage.

3. Agrifood

- ECE quality standards for agricultural produce traded internationally and nationally can help to improve maintenance of product qualities along the supply chain to prevent and reduce food loss, and
- The ECE food loss and waste measuring methodology for fresh produce supply chains can help record losses and waste from production to wholesale levels and can create opportunities to redistribute food through or to alternative food chains.

11. Transitioning to a circular economy calls for intervention by different actors at different levels of policymaking (i.e. national, regional, sub-regional) and in different areas (e.g. public and private sector). For example, policymakers may wish to define and develop the traceability tools that can foster and support better decision-making, transparency, control and accountability in complex industries dealing with great economic, environmental and social pressures. Private sector actors may wish to not only embed circular economy principles into their strategic management, operations and production, but also promote collaboration among stakeholders and involve local communities.

12. Governments deciding to design, develop and implement a policy framework on traceability and circularity may wish to consider taking action along three pillars:

Pillar I. Circular strategy: Defining strategic directions of the circular economy, e.g.

- Assessing the market scenario and market drivers in a targeted sector;
- Tailoring policies to the specificities of the target sector (e.g. agrifood, minerals, textiles);
- Setting up a multi-stakeholder dialogue and partnership with industry actors; and
- Developing a circular economy strategy that supports adoption of circular economy business models.

Pillar II. Circular actions and cross-sectoral connectivity: Introducing targeted policy measures, e.g.

- Defining a circular economy road map with checkpoints to assess progress;
- Creating an effective and efficient system of incentives, particularly for SMEs;
- Supporting a national, globally connected, trading platform to connect value chain actors;
- Providing information and support to SMEs and MSMEs; and
- Raising consumer awareness and providing education and incentives.

Pillar III. From traceability to circularity: Enhancing the traceability environment for the circular transition, e.g

- Establishing mandatory requirements on traceability, with a minimum criteria and data set;
- Identifying and analysing international best practices on traceability and circularity;
- Developing common traceability standards for the collection and exchange of information;
- Promoting research and development, to harness the potential of innovation;
- Facilitating the adoption of digital tools and advanced technologies; and
- Encouraging strong partnerships among organizations, investors, consumers and other stakeholders.

III. Way forward

13. In today's dynamic policy environments, at the international, regional and national levels, stakeholders – including the international development community – may consider the following actions:

- **Raising awareness of the link between traceability of value chains and the circular economy, and with relevant Sustainable Development Goals of the United Nations 2030 Agenda.** The development of flexible and dynamic policy and regulations on traceability of value chains that reflects the interests of the wide stakeholder community for the circular transition. This involves bringing the

traceability angle to the attention of the circular economy community and bringing the circular economy angle to the attention of the traceability community, and importantly, involving those initiatives that already entail a focus on a particular value chain. Some countries have made impressive headway in moving towards mandatory corporate transparency and introducing rules on human rights due diligence. International standards, such as the UN Guiding Principles on Business and Human Rights and the OECD Due Diligence Guidance for Multinational Enterprises, are the starting point for corporate transparency requests. The international trade policy side, the recently established Working Group on Circular Economy, part of the World Trade Organization Trade and Environmental Sustainability Structured Discussions, looks at sustainability approaches across product life cycles. In this connection “Circular STEP”, the ECE network of officially nominated focal points for circular economy in countries with economies in transition, can also play a key contributing role.

- **Stepping up the implementation of the UNECE Sustainability Pledge for traceability, transparency and circularity in the garments and footwear sector, including the blockchain pilots.** Building on the momentum created by the more than 80 pledges from more than 350 partners in 22 countries across the world since its launch at the 69th ECE session, more pledges are invited for recording and showcasing through the ECE platform. The aim of this Call to Action is to establish a global community of practice for sharing effective approaches and lessons learned and to develop a common set of key performance indicators to monitor and report on progress. Furthermore, on the basis of the proof of concept for the cotton and leather blockchains and the successful pilots run under the initiative in a wide range of emerging economies, including Brazil, Egypt, Peru and Uzbekistan, additional experience can be gained in other countries. So far, among ECE’s 17 programme countries, Uzbekistan has joined the Sustainability Pledge, and a blockchain pilot in cooperation with Uzbekistan Textile and Leather Industry Association is ready to be rolled out, to explore the potential for trusted ESG compliance as a means to better access international markets and investment opportunities.
- **Expanding the successful approach to the agrifood and minerals sectors.** Based on the successful experience with the UNECE Sustainability Pledge, including a UN/CEFACT Policy Recommendation, implementation guidelines and an information exchange standard, ECE will develop two similar traceability toolboxes for the minerals and agrifood sectors. Under the umbrella of the ECE Team of Specialists on ESG Traceability of Sustainable Value Chains in the Circular Economy, the work will involve technical experts, private sector representatives and member State delegates.
- **Making the traceability of value chains inclusive in terms of industry actors and countries.** Not all actors are equally well placed to benefit from traceability in value chains. MSMEs, including women-owned ones, and businesses in countries with economies in transition will need assistance to respond to challenges and to harness opportunities. Attention will need to be given to ensuring that traceability does not create barriers to trade, but instead, serves as an enabler of trade, with trickle-down benefits for the poor and marginalized. There is a need to create an enabling environment for a transition that includes a safety net for those who need it.

14. Through its Sustainability Pledge, including ECE Recommendation No. 46, implementation guidelines and an information exchange standard, ECE (with financial support from the European Commission’s General Directorate for International Partnerships) has been at the forefront of promoting traceability and transparency in the garments and footwear sectors. ECE now stands ready to expand this successful approach to two more sectors – agrifood and minerals – to accelerate the circular transition in line with the conclusions and recommendations of the ECE 69th session on “Promoting circular economy and sustainable use of natural resources in the ECE region”. Through its three core functions – development of norms, standards and legal instruments; hosting of a convening platform; and technical cooperation and capacity-building, ECE offers a unique platform for supporting member States in their ambition to harness the power of traceability for the circular transition.

15. ECE member States as well as the international donor community are invited to discuss the preliminary findings and recommendations of this study and support the decisions of the second session of the Team of Specialists on ESG Traceability of Sustainable Value Chains in the Circular Economy, to further strengthen its work and support of the transition economies in advancing the circular economy by enhancing effective traceability solutions in the garments and footwear, minerals and agrifood sectors.

Part II: Annex

Enhancing Traceability of Products along International Value Chains for the Circular Economy and Sustainable Use of Resources

DRAFT

Executive Summary

I. Background

1. UNECE supports member States in the circular transition across different areas and industries. UNECE has been developing tools and supporting initiatives to promote traceability of products alongside value chains. To analyse the role of traceability as an accelerator of the circular economy (CE) UNECE developed a policy paper “Enhancing Traceability of Products along International Value Chains for the Circular Economy and Sustainable Use of Resources” that provides an overview of the state of play of the policy and regulatory framework and best practices on traceability and circularity in the UNECE region and identifies a set of policy options to be established by policy makers in consultation with relevant stakeholders to achieve the green transition. The advanced draft of the policy paper is to be finalised in view of the ECE 70th Commission session in April 2023.
2. The policy paper has been developed within the United Nations Development Account project “Accelerating the transition towards a circular economy and sustainable use of natural resources in the UNECE region” (2021-2024) implemented by UNECE in partnership with the UN Environmental Programme. The project aims to accelerate the transition to a CE in the region, while supporting efforts to build-back-better after the COVID-19 pandemic. It supports the design and implementation of national policies, programmes, and strategies on waste management, public procurement, innovation, trade, and traceability of value chains.
3. Traceability is the ability to identify and trace the history, distribution, location and use of products, parts, and materials. It is the key to product life-cycle analysis and circular business models. The truthful information obtained can help reduce the use of new sources, reuse products and parts, recycle waste, and develop circular product design. It can address the growing demand for data and information about sustainability performance of products, processes, and organizations along the entire value chain to prove credibility of sustainability claims.

II. Action plan

4. Governments have the leading role in creating an enabling environment for circular progress and developing effective policy measures to foster traceability for circularity. The full potential of traceability and transparency can be leveraged using advanced technologies, such as blockchain, radio-frequency identification, artificial intelligence and internet of things, as key mechanisms to increase connectivity among value chain actors. This enables real-time identification as well as tracking of products and their components across their entire life cycle, and into their second and subsequent lives. The following recommendations are entry points that can help facilitate this process.
5. **Raising awareness of the link between traceability of value chains and a CE, and more with 2030 Agenda for Sustainable Development and Sustainable Development Goals (SDGs).** The development of flexible and dynamic policy and regulation on traceability that reflects the interests of the wider stakeholder community is key to move towards the transition to a CE. This could involve bringing the traceability angle to the attention of the CE community, bringing CE to the attention of the traceability community, and importantly, involving those initiatives that already take a particular value chain angle. Some countries had made an impressive headway in improving mandatory corporate transparency introducing new rules on conducting human rights due diligence. International standards such as the UN Guiding Principles on Business and Human Rights and the OECD Due Diligence Guidance for Multinational Enterprises are the starting point for all corporate transparency requests. On the trade policy side, the recently established Working Group on CE, part of WTO Trade and Environmental Sustainability Structured Discussions, offers an entry point to sustainability across product life cycles. The UNECE network “Circular STEP”, including officially nominated circular economy focal points in countries with economies in transition, can play a key contributing role.
6. **Stepping up the implementation of the UNECE Sustainability Pledge for traceability, transparency and circularity in the garment and footwear sectors, including the blockchain pilots.** Building on the momentum created by the more than 76 pledges received from 67 actors, including 287 partners in 22 countries, more pledges are invited for recording and showcasing via the UNECE platform. Based on the proof of concept for the cotton block-chains and the successful pilots run in Brazil, Egypt and Peru, additional experience can be

gained by running pilots in further countries. So far, among UNECE's 17 programme countries, Uzbekistan has joined the Sustainability Pledge and a blockchain pilot in cooperation with Uzbekistan Textile and Garment Industry Association is ready to be rolled out.

7. **Expanding the successful approach to the agrifood and minerals sectors.** Based on the successful experience with the UNECE "The Sustainability Pledge" including a UN/CEFACT Policy Recommendation, implementation guidelines and an information exchange standard, UNECE will develop two similar traceability toolboxes for the minerals and agrifood sectors. Under the umbrella of the UNECE Team of Specialists on Environmental, Social and Governance Traceability of Sustainable Value Chains in the Circular Economy, work will involve technical experts, private sector representatives and member State delegates.
8. **Making the traceability of value chains inclusive in terms of industry actors and countries.** Not all actors are equally well placed to benefit from traceability in value chains. Micro-, small, and medium-sized enterprises, including women-owned ones, and businesses in countries with economies in transition, will need assistance to respond to challenges and to harness opportunities. Attention will need to be given to ensure that traceability does not create barriers to trade, but instead, will serve as an enabler of trade, with trickle down benefits for the poor and marginalized. There is a need to create an enabling environment for a transition that includes a safety net for those who need it.

III. Sectoral approach

9. In the UNECE region, agrifood, garments and footwear and minerals are among the strategically important sectors that have enormous potential for the circular transition. To harness significant role of these three sectors in attaining the SDGs there is a strong need to limit the current linear economy models. The current linear economic structure is causing negative environmental, social, and health-related externalities. It is driving, and it is driven by, a continuously growing demand to consume new products. It is compounded by the increasing complexity of value chains, including in so-called sustainability hotspot sectors, such as garments and footwear, agrifood, and minerals.
10. Considering the heterogeneous pace of socio-economic development, income level, and sectoral composition in UNECE member States, policy options and recommendations are subject to adaptation to concrete national situation. Some of the central recommendations to enhance traceability in value chains for circularity are based on the uptake of UNECE tools and deliverables, which include as follows, listed by target sector:

Garment and footwear

- Policy Recommendation No. 46, guidelines, and a call to action for governments, companies, decision- and policymakers to facilitate the exchange of good practices and lessons learned.
- Business and Data Model developed by UNECE and UN/CEFACT for the exchange of traceability and sustainability information and its implementation through UNECE Blockchain Pilots to prove full traceability of finished textile and leather products from field to shelf.

Minerals

- The United Nations Resource Management System, as a voluntary global standard and applicable to all natural resources, presents a comprehensive tool kit to ensure natural resources are managed in a sustainable and integrated manner.
- Resources as a Service tool provides stakeholders with options, checklists, and guidelines to implement a circular transition.
- United Nations Framework Classification for Resources is a global classification and management system applicable to mineral, petroleum, nuclear fuel, renewable energy, and anthropogenic resources, as well as water and injection projects for geological storage.

Agrifood

- Review of quality standards for agricultural produce traded internationally and nationally, ensures the maintenance of the products' qualities along the supply chain to prevent and reduce food loss.

- Food loss and waste measuring methodology for fresh produce supply chains records losses and waste from production to wholesale levels, which can further be integrated into an IT-based management system to help trace and make food visible that would otherwise be lost or wasted. It creates opportunities to re-distribute food through or to alternative food chains.

IV. Recommendations of the policy paper

11. Traceability is a tool that can accelerate the circular transition in complex production processes of industrial goods and materials. The following policy options might be considered by governments in the design, development, and implementation of a policy framework on traceability and circularity in the UNECE region:

Pillar I. Circular strategy: defining strategic directions of the circular economy.

- Access the market scenario and market drivers in a targeted sector.
- Tailor the sectoral policy.
- Set up a multistakeholder dialogue with industry stakeholders.
- Develop a circular economy strategy that supports adoption of circular economy business models.

Pillar II. Circular actions and cross-sectoral connectivity: introducing targeted policy measures.

- Define a circular economy roadmap with checkpoints to assess the progress.
- Create an effective and efficient system of incentives, particularly for SMEs.
- Support a national, globally connected, trading platform.
- Provide information and support to SMEs and MSEs.
- Raise consumers awareness and education and provide consumers incentives.

Pillar III. From traceability to circularity: enhancing traceability environment for the circular transition.

- Establish mandatory requirements on traceability.
- Identify and analyse international best practices on traceability and circularity.
- Develop common traceability standards.
- Promote research and development.
- Facilitate the adoption of digital tools and advanced technologies.
- Encourage strong partnerships among organizations, investors, consumers, and other stakeholders.

12. Transitioning to a circular economy calls for intervention of different key actors at different levels. Policy makers should define and develop the traceability tools able to foster and support better decision-making, transparency, control, and accountability in complex industries dealing with great economic, environmental, and social pressures. Organizations should not only embed circular economy principles into their strategic management, operations, and production, but also promote collaboration among stakeholders and involving local communities.

V. Way forward

13. Through its “The Sustainability Pledge”, including UN/CEFACT Policy Recommendation N°46, implementation guidelines and an information exchange standard, UNECE (with financial support of the European Commission’s Department for International Partnerships) has been at the forefront of promoting traceability and transparency in garment and footwear sectors. UNECE now stands ready to expand this successful approach to two further sectors – agrifood and minerals – for accelerating the circular transition in line with the ECE 69th Commission session on “Promoting circular economy and sustainable use of natural resources in the UNECE region”. Through its three core functions – development of norms, standards, and legal instruments; hosting of a convening platform; and technical cooperation and capacity building, UNECE offers a unique platform for supporting member States in their ambition to harness the power of traceability for the circular transition.
14. UNECE member States, as well as international donor community are invited to support the decisions of the Second session of the Team of Specialists on Environmental, Social and Governance Traceability of Sustainable Value Chains in the Circular Economy to further strengthen its work and support of the transition economies in advancing the CE by enhancing effective traceability solutions in garment and footwear, minerals, and agrifood sectors.

Contents

| | |
|---|-----------|
| 1. Introduction | 12 |
| 1.1. Outline of the paper | 12 |
| 1.2. Purpose..... | 12 |
| 1.3. Methodology | 12 |
| 2. From traceability of value chains to the circular economy | 17 |
| 2.1. Correlation between traceability of value chains and the circular economy | 17 |
| 2.2. Traceability and transparency: what are these concepts and why do they matter?..... | 18 |
| 2.3. Current challenges in the UNECE region for traceability of value chains | 19 |
| 3. Drivers of traceability | 21 |
| 3.1. Market trends: Consumers and investors' demand..... | 21 |
| 4. Circular approaches in sustainable value chains..... | 34 |
| 4.1. Benefits and challenges of making value chains circular..... | 34 |
| 4.2. Case studies and best practices in the UNECE region..... | 35 |
| 4.3. Implementing value chain traceability technology tools for circularity..... | 43 |
| 5. Recommendations on traceability of value chains for a better transition to the circular economy | 48 |
| 5.1. UNECE policy tools and relevant publications..... | 48 |
| Bibliography | 55 |

1. Introduction

1.1. Outline of the paper

This policy paper provides an analysis of policy and regulatory frameworks, approaches and international best practices for traceability and transparency of value chains, to advance the transition to a circular economy in the UNECE region.

Chapter 1 describes the purpose, methodology and sectoral and geographical scope. It also discusses the environmental, social and economic impacts of the target sectors, namely agrifood, garments and footwear, and minerals.

Chapter 2 focuses on the correlation between traceability and circularity. It explains what these concepts are, what they offer and what are the main barriers to their implementation in the UNECE region are, particularly for small and medium-sized enterprises (SMEs).

Chapter 3 introduces the drivers of traceability and transparency in the UNECE region. It discusses the demands and expectations of consumers, investors and regulators for the environmental, social and economic performance of products, processes and organizations.

Chapter 4 emphasizes the key benefits and challenges of the transition to a circular economy in the UNECE region; identifies international best circular practices from the private sector found in the agri- food, garments and footwear, and minerals value chains; and explores new technologies and solutions that can support the circular transition in these sectors.

Chapter 5 considers UNECE studies and tools that provide a basis for selecting which policy options show the greatest potential and for understanding which policy interventions could help shift the target sectors towards circularity, particularly in the transition economies. It then presents a set of recommendations on measures policy makers should put in place to develop a traceability and transparency model for circular value chains across these sectors in the UNECE region.

1.2. Purpose

The purpose of this paper is to review the state of play of traceability and transparency approaches in the UNECE region, to provide an overview of the challenges and opportunities in advancing the circular economy, and to highlight successful practices from the whole region. It outlines policy recommendations for fostering the use of traceability and transparency across critical sectors in support of a circular economy transition in UNECE's programme countries, focusing on the agrifood, garments and footwear, and minerals sectors.

The paper was developed within the United Nations Development Account (UNDA) project "Accelerating the transition towards a circular economy and sustainable use of natural resources in the UNECE region" (2021–2024), implemented by UNECE in partnership with the United Nations Environment Programme. The project aims to accelerate the transition to a circular economy in the region, while supporting efforts to build back better after the COVID-19 pandemic. In particular it supports the design and implementation of national policies, programmes, and strategies on waste management, public procurement, innovation, trade and traceability of value chains.

1.3. Methodology

This policy paper is based on the findings of a consultation process conducted by UNECE and its consultancy team. It is the *result of an in-depth desk analysis and a field analysis*.

The first analysis reviewed policies, regulations and guidelines from governments and organizations worldwide, and international best practices on traceability and transparency in the agrifood, garments and footwear, and minerals sectors to determine supporting measures and approaches for advancing traceability, transparency, sustainability and circularity. The second analysis was based on the collection of inputs in writing and through interviews. A questionnaire with 24 items was provided to national focal points for the project, aiming to acquire information, insights, and perspectives on the current scenario of traceability and transparency for circularity in the UNECE region. Between March and June 2022, oral interviews with government representatives were also carried out, to conduct a deep dive into the key issues in advancing traceability and transparency in the region.

In answering the questions, the interviewees considered the scope of the project and the whole supply chain, from raw material inputs all the way to post-consumer waste.

The replies were valuable for understanding and validating policy options and related impacts for the development of the paper, and they have been reflected in the findings and conclusions.

1.4. Geographical and sectoral scope

This paper focuses on three sectors: agrifood, garments and footwear, and minerals.

Statistics indicate the economic importance of the targeted sectors in the UNECE region, their impacts on people and the environment, and their relevance for the circular economy transition.

These are sectors in which there is a strong need to address systemic environmental, social and human rights risks; to limit the current linear economy model; and to develop a regulatory framework that enables the transition to a circular economy. The COVID-19 pandemic has highlighted these risks and their extent throughout value chains that span countries and regions. These risks represent a matter of global concern, to be put at the top of policy makers' priorities.

These three sectors have strong potential to embrace circular economy practices. Furthermore, they are foundational economic sources for marginalized segments of society and major economic contributors in transition economies. Thus, they play a significant role in attaining the Sustainable Development Goals.

The agrifood sector

Europe and Central Asia account for 16 per cent of the global value of agricultural and fish production¹. Major agricultural producers include the European Union, Kazakhstan, the Russian Federation, Türkiye, Ukraine and the United Kingdom. Agriculture is a large source of domestic employment in the UNECE region. As of 2019 the share of agriculture in total employment covered almost 50 per cent of the employed population in Tajikistan, 38 per cent in Georgia, and 36 per cent in both Albania and Azerbaijan (figure 1). Over the next decade, global agricultural production is projected to increase by 1.1 per cent.² This sector is key to reducing poverty and achieving the Sustainable Development Goals, but it is highly exposed to current and future climate risks.

In fact, agriculture is not only sensitive to climate change but also a reason for it. The Agrifood sector is the second largest emitter of greenhouse gases after the energy sector, and in 2019 accounted for 31 per cent of global greenhouse gas emissions.³ In 2019, agricultural value chains used 12.5 million tonnes of plastic products in plant and animal production and 37.3 million tonnes more in food packaging. Furthermore, the agricultural plastic industry forecasts that global demand for greenhouse, mulching and silage films will increase by 50 per cent, from 6.1 million tonnes in 2018 to 9.5 million tonnes in 2030.⁴ Agriculture is by far the largest water user, especially in low and middle-income countries. Worldwide, 72 per cent of all water withdrawals⁵ are used in agriculture.⁶

¹ OECD /FAO, OECD-FAO Agricultural Outlook 2022-2031 (OECD Publishing, Paris, 2022) available at: <https://doi.org/10.1787/f1b0b29c-en>

² OECD/FAO, OECD-FAO Agricultural Outlook 2022-2031 (OECD Publishing, Paris, 2022), available at: <https://doi.org/10.1787/f1b0b29c-en>

³ FAO (2022). The State of Agricultural Commodity Markets 2022. The Geography of Food and Agricultural Trade: Policy Approaches for Sustainable Development (Rome, FAO, 2022), available at: <https://doi.org/10.4060/cc0471en>

⁴ FAO. Assessment of Agricultural Plastics and Their Sustainability: A Call for Action, 2021. Available at <https://www.fao.org/documents/card/en/c/cb7856en>

⁵ Water withdrawals, or water abstractions, are defined as freshwater taken from ground or surface water sources, either permanently or temporarily, and conveyed to a place of use, according to the OECD. Available at <https://data.oecd.org/water/water-withdrawals.htm#:~:text=Waterper cent20withdrawals-,Waterper cent20withdrawalsper cent2Cper cent20orper cent20waterper cent20abstractionsper cent2Cper cent20areper cent20definedper cent20asper cent20freshwaterper cent20taken,to per cent20aper cent20placeper cent20ofper cent20use>

⁶ UN-Water, Summary Progress Update 2021: SDG 6 — Water and Sanitation for All, July 2021. Available at https://www.unwater.org/app/uploads/2021/12/SDG-6-Summary-Progress-Update-2021_Version-July-2021a.pdf

The garments and footwear sector

The garments and footwear sector is an important driver of value creation and economic growth. The revenue of the global apparel market was calculated to amount to \$1.5 trillion in 2021 and predicted to increase to approximately \$2 trillion by 2026.⁷ Garments and footwear products account for a high share of the export revenue in UNECE member States, ranging from 0.5 per cent of the total export value in Azerbaijan to 24.2 per cent in Albania in the period 2016–2020 (table 1). The world's top exporters, in terms of value, comprise a mix of high-income countries (Italy, Germany, the Netherlands, France, Spain) and middle-income countries (China, Viet Nam, Bangladesh, Türkiye, India).⁸ Garments and footwear is a labour-intensive sector. In 2019, it employed approximately 91 million workers worldwide.

Table 1. Share of selected priority export products (among the top-10 positions) in total exports of UNECE member States to the world market, 2016–2020⁹

| Agrifood sector | |
|---|---|
| Fruits and nuts (excluding oil nuts), fresh or dried | Azerbaijan (2.0per cent), Bulgaria (8.3per cent), Georgia (4.6per cent), Greece (3.0per cent), Kyrgyzstan (1.8per cent), Republic of Moldova (8.2per cent), Spain (3.2per cent), Tajikistan (2.0per cent), Turkey (2.6per cent), Uzbekistan (5.3per cent) |
| Wheat (including spelt) and meslin, unmilled | Bulgaria (2.9per cent), Kazakhstan (1.7per cent), Latvia (3.5per cent), Lithuania (2.1per cent), Moldova (3.4per cent), Russia (2.0per cent), Ukraine (7.0per cent) |
| Fish, fresh (live or dead), chilled or frozen | Denmark (2.0per cent), Greece (1.9per cent), Iceland (30.9per cent), Malta (3.8per cent), Norway (10.5per cent), Sweden (2.7per cent) |
| Vegetables | Albania (2.7per cent), Azerbaijan (1.3per cent), Cyprus (1.7per cent), Kyrgyzstan (4.5per cent), Spain (2.4per cent), Uzbekistan (2.7per cent) |
| Cotton | Azerbaijan (0.5per cent), Kyrgyzstan (1.9per cent), Tajikistan (14.8per cent), Turkmenistan (2.1per cent), Uzbekistan (5.4per cent) |
| Cheese and curd | Belarus (3.1per cent), Cyprus (6.5per cent), Denmark (1.9per cent), Greece (1.5per cent) |
| Maize (not including sweet corn), unmilled | Moldova (3.3per cent), Serbia (2.4per cent), Ukraine (8.5per cent) |
| Fixed vegetable fats and oils, crude, refined, fractionated | Greece (1.9per cent), Moldova (2.8per cent), Ukraine (10.2per cent) |
| | |
| Garments and footwear sector | |
| Footwear | Albania (24.2per cent), Bosnia and Herzegovina (8.2per cent), Croatia (1.7per cent), Italy (2.3per cent), Portugal (3.4per cent), Romania (1.9per cent) |
| Articles of apparel | Albania (5.3per cent), Andorra (3.3per cent), Moldova (3.3per cent), Portugal (2.6per cent), Turkey (3.3per cent) |
| Womens' clothing, of textile fabrics | Albania (3.6per cent), Armenia (3.1per cent), Kyrgyzstan (1.8per cent), Moldova (3.4per cent), North Macedonia (3.1per cent), Spain (1.6per cent) |
| Mens' clothing of textile fabrics, not knitted | Albania (7.8per cent), Armenia (3.1per cent), North Macedonia (2.9per cent) |
| Textile yarn | Turkmenistan (2per cent), Uzbekistan (7.4per cent) |

⁷ Statista, "Global apparel market - statistics & facts", 3 March 2022. Available at https://www.statista.com/topics/5091/apparel-market-worldwide/#topicHeader__wrapper

⁸ ILO, "The state of the apparel and footwear industry: employment, automation and their gender dimensions", January 2022. Available at: https://www.ilo.org/wcmsp5/groups/public/---ed_emp/documents/publication/wcms_835423.pdf

⁹ The product selection is made in accordance with Standard International Trade Classification (SITC) Revision 3. Available at: https://unctadstat.unctad.org/EN/Classifications/DimSicRev3Products_Official_Hierarchy.pdf

| Minerals sector | |
|---|--|
| Aluminium | Armenia (3.2per cent), Azerbaijan (0.7per cent), Bosnia and Herzegovina (3.4per cent), Canada (1.8per cent), Croatia (1.8per cent), Greece (5.0per cent), Iceland (37.6per cent), Montenegro (17.6per cent), Norway (3.7per cent), Russia (1.7per cent), Slovenia (2.4per cent), Tajikistan (29.7per cent) |
| Gold, non-monetary (excluding gold ores and concentrates) | Andorra (3.5per cent), Armenia (8.0per cent), Azerbaijan (0.9per cent), Canada (3.6per cent), Georgia (2.6per cent), Kyrgyzstan (41.8per cent), Switzerland and Liechtenstein (22.8per cent together), Tajikistan (8.6per cent), Turkey (2.7per cent), United Kingdom (5.3per cent), Uzbekistan (26.5per cent) |
| Pig iron and spiegeleisen, sponge iron, powder and granulated | Albania (3.1per cent), Armenia (4.9per cent), Georgia (9per cent), Iceland (2.8per cent), Kazakhstan (3.9per cent), Ukraine (3.8per cent) |
| Copper | Bulgaria (8.3per cent), Greece (1.8per cent), Kazakhstan (4.8per cent), Russia (1.4per cent), Serbia (3.0per cent), Uzbekistan (6.8per cent) |
| Iron and steel bars, rods, angles, shapes and sections | Bosnia and Hercegovina (3.3per cent), Belarus (2.1per cent), Montenegro (4.3per cent), Turkey (2.8per cent), Ukraine (3.3per cent) |
| Ores and concentrates of base metals | Albania (3.6per cent), Kyrgyzstan (3.3per cent), Montenegro (3.8per cent), Tajikistan (14.8per cent) |
| Copper ores and concentrates; copper mattes, cement | Armenia (28.4per cent), Georgia (17.5per cent), Kazakhstan (2.0per cent), Kyrgyzstan (7.1per cent), Tajikistan (2.6per cent) |
| Zinc | Uzbekistan (1.9per cent) |
| Nickel | Norway (1.1per cent) |

Source: UNECE, based on UNCTADstat. (https://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx?sCS_ChosenLang=en)

The European Union (EU) plays a key role in the global garments and footwear sector, both as an importer and consumer and as a producer and exporter of final products and semi-manufactures. In 2019 the EU-27 imported textiles and clothing at the estimated value of \$106 billion.¹⁰ After China the EU-27 is the second largest exporter of textiles with an estimated export value 56 billion euro (including intra-EU exports), and the second largest exporter of clothing – 110 billion euro. One third of textiles and clothes are sold from China to the EU markets.

Garments and footwear is a resource-intensive sector and associated with serious social and environmental risks. The fashion industry uses some 93 billion cubic metres of water a year – enough to meet the needs of 5 million people, contributing significantly to water scarcity in some regions.¹¹ The garments and footwear sector alone produces 2.1 billion tons (4per cent) of greenhouse gas emissions, equivalent to the emissions of France, Germany, and the UK combined.¹² Each year it creates around 90 million tons of waste¹³ and discards or burns 87per cent of textiles, costing \$100 billion.¹⁴ In total, about \$500 billion of value is lost because of the lack of recycling and poor utilization of clothing.

¹⁰ EURATEX (2022). Facts & key figures 2022 of the European textile and clothing industry, 2022. Available at: <https://euratex.eu/facts-and-key-figures/>

¹¹ UNCTAD Report maps manufacturing pollution in sub-Saharan Africa and South Asia, 24 September. Available at: <https://unctad.org/news/report-maps-manufacturing-pollution-in-sub-saharan-africa-and-south-asia>

¹² McKinsey (2020). Fashion on Climate, How the Fashion Industry Can Urgently Act to Reduce Its Greenhouse Gas Emissions. Available at: <https://www.mckinsey.com/~media/mckinsey/industries/retail/ourper cent20insights/fashionper cent20onper cent20climate/fashion-on-climate-full-report.pdf>

¹³ BBC, “Why clothes are so hard to recycle”, 13 July 2020. Available at <https://www.bbc.com/future/article/20200710-why-clothes-are-so-hard-to-recycle>

¹⁴ World Bank, “How much do our wardrobes cost to the environment?”, 23 September 2019. Available at: <https://www.worldbank.org/en/news/feature/2019/09/23/costo-moda-medio-ambiente>

Child labour and forced labour are also sectoral risks.¹⁵ The United Nations Children’s Fund (UNICEF) estimates that worldwide the garments and footwear supply chain affects more than 100 million children.¹⁶

The minerals sector

Minerals¹⁷ and mineral products are the backbone of most industries. Currently, mineral resource extraction is critical for the economies of 81 countries that account for a quarter of global gross domestic product (GDP) and half of the world’s population.¹⁸ Leading mining countries in 2018, based on mineral production value, were Australia, China, Russia, and the United States.¹⁹

The minerals sector is energy-intensive and contributes to greenhouse gas emissions through the use of energy in mining and smelting operations.²⁰ It is estimated that mining is responsible for 4 to 7 per cent of global greenhouse gas emissions.²¹ Furthermore, 30 to 50 per cent of the production of copper, gold, iron ore and zinc is concentrated in areas where water stress is already high. These four commodities are clustered in seven water-stress hotspots, which include Central Asia and western North America.

The mining industry accounts for 2 to 11 per cent of the world’s total energy consumption.²² In the context of the energy transition and rising geopolitical tensions, major shifts in energy demand are inevitable. Additional supplies of relatively large volumes of raw materials will be required, such as copper for electrification, nickel for batteries of electric vehicles, tellurium for solar panels and neodymium for permanent magnets.²³ Demand for copper, aluminium, iron, and manganese will increase substantially as production of electric vehicles rises.²⁴

¹⁵ OECD (2020), OECD Feasibility Study: Measuring the Uptake and Impact of Due Diligence in the Garment and Footwear Sector Supply Chain. Available at <http://mneguidelines.oecd.org/OECD-feasibility-study.pdf>

¹⁶ UNICEF, Children’s Rights in the Garment and Footwear Supply Chain: A Practical Tool for Integrating Children’s Rights into Responsible Sourcing Frameworks, Article One, June 2020. Available at <https://www.unicef.org/media/70121/file/Childrens-rights-in-the-garment-and-footwear-supply-chain-2020.pdf>.

¹⁷ A mineral resource is a concentration or occurrence of solid material of economic interest in or on the Earth’s crust in such form, grade, quality and quantity that prospects for eventual economic extraction are reasonable, according to the definition of the Committee for Mineral Reserves International Reporting Standards, available at https://www.criirco.com/docs/CRIRSCO_standard_definitions_oct2012.pdf

¹⁸ United Nations, “Transforming extractive industries for sustainable development”, May 2021, available at <https://unece.org/sites/default/files/2021-05/SGper%20Policyper%20Briefper%20Extractivesper%20NOemb.pdf>

¹⁹ Statista (2022). Leading mining countries worldwide in 2018, based on mineral production value (in billion USD). Available at: <https://www.statista.com/statistics/1114898/leading-mining-countries-worldwide-based-mineral-production-value/#:~:text=Inper%202018per%20Cper%20China%20wasper%20by,productionper%20valueper%20theper%20sameper%20year>

²⁰ UNCTAD (United Nations Conference on Trade and Development) (2022). Research Paper No. 84 UNCTAD/SER.RP/2022/4. Growing the good and shrinking the bad: Output-emissions elasticities and green industrial policy in commodity-dependent developing countries, May. Available at: https://unctad.org/system/files/official-document/ser-rp-2022d4_en.pdf

²¹ McKinsey, “Climate risk and decarbonization: what every mining CEO needs to know”, 28 January 2020, available at <https://www.mckinsey.com/business-functions/sustainability/our-insights/climate-risk-and-decarbonization-what-every-mining-ceo-needs-to-know>

²² World Bank Group, Minerals for Climate Action: The Mineral Intensity of the Clean Energy Transition, 2020. Available at: <https://pubdocs.worldbank.org/en/961711588875536384/Minerals-for-Climate-Action-The-Mineral-Intensity-of-the-Clean-Energy-Transition.pdf>

²³ McKinsey, The raw-materials challenge: How the metals and mining sector will be at the core of enabling the energy transition, 10 January 2022. Available at <https://www.mckinsey.com/industries/metals-and-mining/our-insights/the-raw-materials-challenge-how-the-metals-and-mining-sector-will-be-at-the-core-of-enabling-the-energy-transition>

²⁴ IRENA, World Energy Transition Outlook 2022: 1.5° Pathway, March 2022. Available at <https://irena.org/publications/2022/mar/world-energy-transitions-outlook-2022#:~:text=Byper%20layingper%20outper%20aper%20map,useper%20sectorsper%20Aper%20electrificationper%20andper%20bioenergy>

2. From traceability of value chains to the circular economy

2.1. Correlation between traceability of value chains and the circular economy

Global value chains currently are linear, with restricted flows of information, that is shared selectively with consumers and other stakeholders. Effectively implementing the shift from a linear to a circular economic model is an extremely important and far-reaching objective, aiming to improve the living conditions of future generations.

The circular economy is defined as “a model of production and consumption which involves sharing, leasing, reusing, repairing, refurbishing, and recycling existing materials and products as long as possible. In this way, the **life cycle of products is extended**.”²⁵. In fact, the circularity of production processes and consumption patterns refers to the ability to retain the value of products, materials, and resources in the economy for as long as possible and to minimize the generation of waste along all the steps of the value chain²⁶.

“Traceability is crucial for the development of new green business opportunities. Governments, local authorities, and communities need to step in to ensure they prosper in future by promoting sustainability and circularity. We need to start looking at the problem of the circular economy in terms of material flow and access to data for all stakeholders. This should be systematic work at all levels.” [Ukraine](#)

The circular economy is based on three principles:²⁷

- Eliminate waste and pollution.
- Circulate products and materials.
- Regenerate nature.

Moving towards a more circular economy can deliver benefits such as reduced pressure on the environment, improved security of raw materials supply and reduced dependency on their importation, and enhanced competitiveness, and innovation. These in turn contribute to preserving natural capital and boosting economic growth and job creation, in a virtuous circle (producing an additional 0.5per cent of GDP, and 700,000 jobs in the European Union alone by 2030²⁸).

Measures such as waste prevention, eco-design²⁹ and re-use could save companies money while also reducing total annual greenhouse gas emissions³⁰. Currently, the production of materials that we use everyday accounts for 45per cent of such emissions. Implementation of such measures will also provide consumers with more durable and innovative products that will improve their quality of life and save them money in the long term.

An effective circular economy is not only built on continuous material loops, but also reliant on the harmonious exchange of data across value chains. Considering the expected increase in complexity entailed in planning, operating, managing, and evaluating activities in circular pathways, with the involvement of various sectors and stakeholders, a

²⁵ European Parliament, Circular economy: definition, importance and benefits, 26 April 2022. Available at <https://www.europarl.europa.eu/news/en/headlines/economy/20151201STO05603/circular-economy-definition-importance-and-benefits>

²⁶ UNECE, Recommendation No.46: Enhancing traceability and transparency of sustainable value chains in the garment and footwear sector (ECE/TRADE/463), January 2022. Available at <https://unece.org/trade/publications/recommendation-no46-enhancing-traceability-and-transparency-sustainable-value>

²⁷ Ellen Macarthur Foundation, Circular economy introduction. Available at <https://ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview>

²⁸ European Parliament, Draft report on the New Circular Economy Action Plan (2020/2077(INI)) Committee on the Environment, Public Health and Food Safety, Rapporteur: Jan Huitema. 12 October 2020. Available at https://www.europarl.europa.eu/doceo/document/ENVI-PR-652387_EN.html?redirect

²⁹ European Parliament (2018). Ecodesign directive: from energy efficiency to recycling, 24 May. Available at <https://www.europarl.europa.eu/news/en/headlines/society/20180522STO04021/ecodesign-directive-from-energy-efficiency-to-recycling>

³⁰ European Parliament, Greenhouse gas emissions by country and sector (infographic), 28 October 2021. Available at <https://www.europarl.europa.eu/news/en/headlines/priorities/climate-change/20180301STO98928/greenhouse-gas-emissions-by-country-and-sector-infographic>

primary, essential step is to identify the necessary data and information to be gathered, shared, and managed at each stage of a product's lifecycle.³¹

2.2. Traceability and transparency: what are these concepts and why do they matter?

According to UNECE policy recommendations and guidelines for advancing traceability and transparency of sustainable value chains:

Traceability is understood as “the ability to trace the history, application or location of an object³²” in a supply chain. In this context, it is defined as the ability to identify and trace the history, distribution, location and use of products, parts and materials, to ensure the reliability of sustainability claims related to of human rights, labour (including health and safety), the environment and anti-corruption³³ as well as “the process by which enterprises track materials and products and the conditions in which they were produced through the supply chain”³⁴.

Transparency³⁵ is understood as relevant information being made available to all elements of the value chain in a standardized way, which enables common understanding, accessibility, clarity and comparability.

Traceability is a key enabler of transparency because (a) it gives companies better visibility and control of their value chains and enables them to address the environmental and social risks along those chains and achieve higher resource efficiency, and (b) it informs consumers about the sustainability aspects of products, processes and organizations so they can make more responsible purchasing choices. The result is a sustainable market based on accountability and trust among all relevant actors.

Traceability also offers companies better brand reputation and risk management, better communication with business partners, more efficient supply chains and optimization of available resources. It does so by facilitating reuse of materials, authenticating products, and supporting fair and sustainable trade. It allows companies to take control of the carbon footprints of their products. Moreover, end-to-end traceability is the key to product life-cycle analysis, which helps companies understand and control the environmental and social impacts of any type of product.

“The priority of choosing sustainable and green products must become a new standard for all of us!”
Bosnia and Herzegovina

Traceability also increases the value addition of products in commodity-dependant countries. Commodity dependence continues to be a persistent problem in the UNECE region, especially in transition economies. It affects economic performance by making performance vulnerable to commodity price shocks and causes macroeconomic and microeconomic problems such as declining public investment, increasing public debt, reducing income of households and profitability of companies.³⁶ At the same time increased dependence on natural resources exacerbates the pressure on sensitive ecosystems and ultimately affects human health. According to UNCTAD's classification,³⁷ in 2018–2019 nine developing countries in the UNECE region were considered dependent on commodity exports: Armenia, Azerbaijan,

³¹ UNECE, *Draft United Nations Resource Management System: Principles and Requirements*, 14 April 2022. Available at <https://unece.org/sed/documents/2022/04/session-documents/draft-unrms-principles-and-requirements>

³² ISO 9001:2015 Quality management systems – Requirements, September 2015. Available at <https://www.iso.org/standard/62085.html>

³³ United Nations Global Compact Office (2014). *A Guide to Traceability: A Practical Approach to Advance Sustainability in Global Supply Chains*. Available at <https://www.unglobalcompact.org/library/791>

³⁴ OECD, *Due Diligence Guidance for Responsible Supply Chains in the Garment and Footwear Sector* (Paris, 2018). Available at: <https://www.oecd.org/corporate/mne/responsible-supply-chains-textile-garment-sector.htm>

³⁵ European Commission, *A Background Analysis on Transparency and Traceability in the Garment Value Chain*, 2017. Available at https://platform.ict-tex.eu/pluginfile.php/1536/mod_resource/content/1/european_commission_study_on_background_analysis_on_transparency_and_traceability_in_the_garment_value_chain.pdf

³⁶ UNECE, “Accelerating action for a sustainable and circular garment and footwear industry: which role for transparency and traceability of value chains?”, policy paper ECE/TRADE/449, 2020.

³⁷ UNCTAD, *Commodities and Development Report 2019: Commodity Dependence, Climate Change and the Paris Agreement*, 11 September 2019. Available at <https://unctad.org/webflyer/commodities-and-development-report-2019#:~:text=Theper cent202019per cent20editionper cent20ofper cent20the,changeper cent20andper cent20theper cent20commodityper cent20sectors>.

³⁷ UNCTAD categorizes a country as commodity export dependent when more than 60 per cent of its total merchandise exports are composed of commodities (i.e. agriculture, mining, and energy).

Kazakhstan, Kyrgyzstan, Montenegro, the Russian Federation, Tajikistan, Turkmenistan and Uzbekistan. In 2018–2019 Azerbaijan, Kazakhstan and Turkmenistan had a dependency rate higher than 85 per cent.³⁸

Traceability is also a fundamental instrument for promoting circularity. In fact, one key to a circular economy is the ability to track and trace materials, components and finished products throughout their life cycles and into their second and subsequent lives. Through the implementation of traceability tools, it is possible for stakeholders across value chains to scale-up circular and regenerative approaches – such as reduce, reuse, recycle and remanufacture – both downstream and upstream, in support of circular production processes, circular business models and sustainable investments. The development of traceability systems – for waste prevention and waste management, for chemicals use and management, for chemicals production and waste – and sharing of that information among stakeholders to inform consumers at the point of sale about the product’s entire lifecycle is fundamental for the goal to transition to a circular economy.

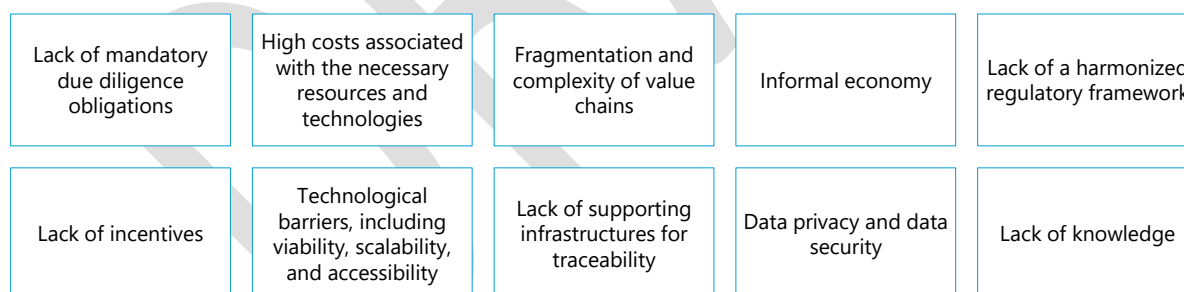
Traceability of value chains represents a vital tool for getting accurate and reliable information while managing resources for careful assessment of value addition potential and planning of a circular transition strategy. The social and environmental challenges posed by the agrifood, garments and footwear, and minerals sectors could be transformed into opportunities when the value addition possibilities are examined over the entire life cycle of products.³⁹

2.3. Current challenges in the UNECE region for traceability of value chains

Various bottlenecks and barriers currently prevent the development and implementation of traceability at scale, particularly when SMEs are involved. Some of the main factors demanding holistic approaches in the modelling of a traceability framework are business- and market-related issues, lack of regulations and regulatory certainty, legislation enacted at different paces in different regions, lack of supporting infrastructure and digital skills, security and privacy concerns, issues related to governmental intervention, and regulatory bodies’ mandates, especially regarding cross-border trade, lack of incentives, technological barriers and conservative thinking.

Given the heterogeneous socio-economic development pace, income level and sectoral composition in UNECE member States, these challenges as well as their scale, vary.

Figure 3. Key challenges to advancing traceability in the UNECE region.



Source: UNECE, desk research (2022).

In attempts to implement traceability in the UNECE region, government and companies face the following recurrent challenges:

Value chain fragmentation and complexity. The complexity of global value chains is today one of the biggest sources of risk for food and textile manufacturers. They involve multiple actors involved in different countries, comprising such activities as planning, procurement, production, logistics and storage, sales, and after-sales service and returns. All of these activities entail different systems and requirements while contributing to the production of a product. Traceability demands good management and effective collaboration among businesses and sectors.

³⁸ UNCTAD, State of Commodity Dependence 2021, Geneva, 2021. Available at: <https://unctad.org/system/files/ofThe-Sustainable-Development-Goals-Report-2022.pdf> (un.org)ficinal-document/ditccom2021d2_en.pdf

³⁹ UNECE, “Draft United Nations resource management system: principles and requirements”, 14 April 2022. Available at <https://unece.org/sed/documents/2022/04/session-documents/draft-unrms-principles-and-requirements>

Fragmentation and complexity concern not only international or regional value chains, but also the national or local levels. For example, in Tajikistan during the harvest, wholesalers operate on a 24/7 basis and are typically crop-specific. Traceability of agricultural products back to the farm level is thus extremely limited because of high turnover as well as the rudimentary packaging and transportation of products from multiple regions to urban wholesalers.⁴⁰

Lack of a harmonized regulatory framework. Sectors face overlapping and conflicting demands from national regulators with a varying range of policies and legislation. Global sourcing of food, textiles and minerals occurs in different jurisdictions and time zones, which pose regulatory and procedural barriers to trade and significantly affect organizations' response times. While visibility and verification of the origin and processing of raw materials are already of great concern, importers also face challenges from counterfeiting, fraud and market substitution for economic gain.

Lack of knowledge about the concept of traceability and how it can help to facilitate more efficient use of resources and ensure compliance with environmental, social and governance requirements will limit access to markets that establish strict – and increasingly stricter – circular-economy requirements. Moreover, this lack of knowledge undermines the effective enrolment of the relevant regulatory frameworks in principle as well as the practical implementation of circular business models at the national level.

Lack of support for organizations on how to implement risk-based due diligence, both within the European Union and UNECE member countries outside it, including how social and environmental risk-based due diligence can complement traceability efforts.⁴¹

High costs associated with the necessary resources and technologies is another challenge on the way to full traceability of value chains, even for organizations in Western Europe, not to mention UNECE programme countries. For example, establishment of a traceability systems requires investments in development of internal control systems as well as creation of a trustworthy data set and protocols. Companies are aware of the importance of implementing traceability frameworks, yet the associated costs impose excessive burden.

Data privacy and data security. Organizations often fear that adoption of traceability systems could lead to disclosure of business-critical information such as pricing, costs, key suppliers and customers – information that represents a business's competitive advantage⁴². Other risks concern data security as there are challenges in ensuring that data systems are secure for all users.

Technological barriers, including viability, scalability, and access to technologies and lack of traceability infrastructure, especially for developing countries and countries with economies in transition. It is challenging not only to get access to traceability technologies, but also to choose the best match for a specific set of traceability objectives, integrate the chosen solution with existing systems and ensure interoperability with other solutions in the value chain. Bain's 2021 Global State of Traceability Survey revealed that most companies are still in the preliminary phase. Only

⁴⁰ USAID, Feed the Future Tajikistan Agriculture and Land Governance Activity: Value Chain Analysis, 31 March 2021. Available at https://pdf.usaid.gov/pdf_docs/PA00XWQ1.pdf

⁴¹ In recent decades worldwide, concerns have emerged about the negative social, economic and environmental impacts of companies and agrifood systems on local communities and biodiversity. The OECD–FAO Guidance for Responsible Agricultural Supply Chains (OECD/FAO, 2016), designed with the support of a multi-stakeholder advisory group, has become an internationally recognized framework for companies on environmental and social risk and development. It covers areas key to business and development in the agriculture sector, illustrating impacts in food security and nutrition, human and labour rights (including child labour), gender, climate change and natural resource depletion (including deforestation), governance, animal welfare, land tenure rights, and technology and innovation, among others. Throughout UNECE member countries, there is an expectation that agrifood companies should reduce adverse development impacts caused through their sourcing and production. In 2021, the OECD–FAO Guidance was embedded as a central agricultural reference for private sector enterprises and for due diligence in the Farm to Fork Strategy Code of Conduct. In 2022, the OECD–FAO Guidance and its risk-based due diligence framework applied to the agricultural sector were featured as part of the European Union's Proposal for a Directive on Corporate Sustainability Due Diligence (European Commission, 2022). Promoted by many countries in Europe and Central Asia, the OECD–FAO Guidance introduces a five-step framework for risk-based due diligence for companies, applicable to all enterprises. In summary, risk-based due diligence

- 1) is rooted in adapting business models to identify, assess, mitigate and prevent negative impacts in supply chains,
- 2) prioritizes by severity and likelihood of the impact,
- 3) considers leverage and impacts caused, contributed, or linked to business activities,
- 4) is flexible, tailored to companies of different sizes, contexts, and other characteristics,
- 5) is dynamic – ongoing, responsive, and informed by stakeholder engagements,
- 6) and views disengagement as a last resort.

⁴² UNECE, "Accelerating action for a sustainable and circular garment and footwear industry: which role for transparency and traceability of value chains?", policy paper, 2020. Available at https://unece.org/DAM/trade/Publications/ECE_TRADE_449-AcceleratingTranspRaceabilityTextile.pdf

15per cent have made progress towards investing in traceability technology and scaling it, and 22per cent are at the beginning of the journey, stuck in the strategy definition stage.⁴³

An **informal economy**⁴⁴ goes hand in hand with the challenges. According to statistics from the International Labour Organization (ILO), in the UNECE regions the share of informal employment is high in Albania (56.7 per cent), Armenia (44.9per cent), Georgia (29.7 per cent), Republic of Moldova (25.1 per cent), Serbia (17.0 per cent), Bosnia and Herzegovina (14.4 per cent), North Macedonia (11.5 per cent), , and dominates in agriculture.⁴⁵ The informal sector, including smallholders farmers, is neither taxed nor monitored by any form of government, making it invisible to traceability systems even where sectoral traceability frameworks are in place.

Among **SMEs**, there is also a low degree of utilization of traceability systems because of the lack of resources and management capacity regarding technology, know-how and skilled labour. SMEs often lack complete, accurate, timely and easily accessible information on products and processes. Furthermore, they often lack awareness of the variety of systems available on the market and how they differ from each other. Their lack of sufficient qualified information technology staff has to be considered as well. Consequently, it is difficult for SMEs to select the most suitable traceability solution for their fields of application to identify the data needed to achieve robust traceability. A methodology that is applicable across industries and products that helps SMEs to select and implement traceability solutions that exactly fit their specific requirements should be developed. Such traceability solutions for SMEs must be cost-effective and user-friendly.

3. Drivers of traceability

3.1. Market trends: Consumers and investors' demand

Market pressures and new regulations are among the drivers of traceability and transparency. Moreover, the COVID-19 pandemic accelerated the weakness of non-traced and non-transparent global value chains and intensified the consumers and investors' attention to the sustainability of products, processes, and organizations.

Consumers and investors are increasingly demanding them. Consumers want to purchase products produced with high levels of environmental and social responsibility. They have an urgent desire to know more about how their products are made, and that they haven't harmed the environment and the people who made them. They also want governments to hold companies accountable to higher social and environmental standards for their operations, products, and services. Meeting these expectations builds public trust and supports sustainable and competitive industries.

Increased traceability leads to transparency, and transparency over the production process enables the industry to share information with consumers that allows them to connect more deeply with the narrative of a product and buy-in more fully to the values of sustainability and circularity. Consumers in fact have a key role to play in the path towards sustainability and circularity, but to be able to play this role they need to be empowered through access to harmonized and reliable information.⁴⁶

Investors are also demanding that companies not only deliver financial performance, but also show how they make a positive contribution to the environment and society. There is a greater expectation among the investor's community, for a more equitable distribution of the benefits, costs and risks related to agrifood, mining, garment, and footwear activities. Investors want to consider ESG data into the investment processes, but this data are provided inconsistently across companies and industries. The biggest barrier to integrate ESG into investment processes is in fact represented by the lack of availability and quality of data.

⁴³ World Economic Forum, Digital traceability: a framework for more sustainable and resilient value chains, September 2021. Available at <https://www.weforum.org/whitepapers/digital-traceability-a-framework-for-more-sustainable-and-resilient-value-chains>

⁴⁴ Informal economy refers to all economic activities by workers and economic units that are – in law or in practice – not covered or insufficiently covered by formal arrangements according to the ILO definition.

⁴⁵ ILO Stat, "Statistics on the informal economy". Available at https://ilostat.ilo.org/topics/informality/#elementor-toc__heading-anchor-1

⁴⁶ The European Commission, European New Consumer Agenda 2021. Available at <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEXper cent3A52020DC0696>

On one side organizations should provide to consumers more sustainable products on the shelf, on the other side they should demonstrate to investors that they have sustainable practices in place.

The demand for improved levels of traceability and transparency is also driven by the United Nations' sustainable development goals (SDGs).

3.2. Policy and regulation: traceability and circularity landscape in the European Union

Traceability and transparency have gained prominence on the agendas of policymakers, particularly in the European Union (EU), since they can contribute to the circular transition that is expected to guide society toward the efficient use of resources and to the dissociation of economic growth from environmental impacts. The EU is currently the global trendsetter and driver with respect to the circularity transformation.

The European Union has long been greatly committed, on all levels, in promoting and an implementing responsible business conduct across all sectors of production and all levels of value chain.

There is an increasing legislative trend towards holding companies accountable for their environmental and human rights practices as well as those of business partners within their value chain.

International standards such as the UNGPS and the OECD Due Diligence Guidance for Multinational Enterprises are the starting point for all corporate transparency requests.

A number of countries of the EU had made impressive headway in improving mandatory corporate transparency introducing new rules on conducting human rights due diligence⁴⁷ (HRDD).

Although many HRDD rules are still voluntary at the national level, the movements to achieve sustainable and responsible corporate practices in connection with human rights are becoming more visible. There are several recent trends in connection with HRDD around the globe: in December 2021, the Swiss Federal Council published the final Ordinance specifying due diligence and reporting obligations relating to conflict minerals and child labour.⁴⁸ Germany passed its Supply Chain Act in the middle of 2021.⁴⁹ The Act, to be effective on 1 January 2023, imposes upon certain business operators an obligation to develop preventive and remedial measures regarding HRDD and environmental due diligence as well as reporting duties. France enacted the Duty of Vigilance Act⁵⁰ which functions as essential legislation in its supply chain legal framework since 2017. The Act requires certain large-size companies to develop a due diligence plan in order to monitor and prevent potential fundamental human rights abuse in their supply chains.

By promoting traceability and transparency through national legislations, governments seeks to improve human rights and environmental protection and enhance overall accountability. However harmonized legislations are needed to create a level playing field. An important step in this direction was taking by the European Union since on February 22nd 2022 released its proposal for a Directive on Corporate Sustainability Due Diligence.⁵¹ The proposal establishes a comprehensive corporate duty to conduct not only HRDD but also due diligence to address impacts on the environment.

⁴⁷ The processes through which enterprises can identify, prevent, mitigate and account for how they address their actual and potential adverse impacts (OECD guidelines for multinational enterprises, chapter II – general policies, para. 10), available at <http://mneguidelines.oecd.org/guidelines/>

⁴⁸ Fedlex (2021). Ordonnance sur les devoirs de diligence et de transparence en matière de minerais et de métaux provenant de zones de conflit et en matière de travail des enfants, 3 December. Available at: <https://www.fedlex.admin.ch/eli/cc/2021/847/fr>

⁴⁹ Federal Ministry of Labour and Social Affairs. Due Diligence Act: Law on corporate due diligence to prevent human rights violations in supply chains. Available at: <https://www.bmas.de/DE/Service/Gesetze-und-Gesetzesvorhaben/gesetz-unternehmerische-sorgfaltspflichten-lieferketten.html>

⁵⁰ LOI n° 2017-399 du 27 mars 2017 relative au devoir de vigilance des sociétés mères et des entreprises donneuses d'ordre. Available at: <https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000034290626/>

⁵¹ The European Commission, Proposal for a Directive on corporate sustainability due diligence and annex, 23 February 2022. Available at: https://ec.europa.eu/info/publications/proposal-directive-corporate-sustainable-due-diligence-and-annex_en

The EU has been very vigilant on human rights violations in certain industries such as mining and fishery. Significant actions have taken place, resulting in the enactment of the Conflict Minerals Regulation⁵² in 2017 and the Common Fisheries Policy⁵³ in 2013.

In fact, in response to growing international concerns over mineral extraction and trade contributing to human rights abuses and conflict financing, EU legislation has focused on transparency and due diligence in mineral supply chains. The EU conflict minerals regulations aims to stop:

- Conflict minerals and metals from being exported to the EU,
- Global and EU smelters and refiners from using conflict minerals, and
- Mine workers from being abused.

The law also supports the development of local communities.

It requires EU companies to ensure they import these minerals and metals from responsible sources only. The requirements started to apply on 1 January 2021.

The Common Fisheries Policy is a set of rules regulating all aspects of fishing within the EU, from the sea to the consumer with the overall objective to ensure economically, environmentally, and socially sustainable use of fisheries resources. More in details the legislation aims at:

- Increasing productivity,
- Stabilising the markets,
- Providing a source of healthy food and,
- Ensuring reasonable prices for consumers.

The requirements started to apply on 1 January 2014.

The shift to a circular economy is a main policy priority for the European Commission: it represents an opportunity to minimize environmental and social impacts creating new job-intensive activities within Europe's industry and bringing more manufacturing back to the EU. With the adoption of the new Circular Economy Action Plan⁵⁴ in 2020, as one of the main blocks of the European Green Deal, the European Commission committed to accelerate the green transition with the development of an integrated product policy and recommended implementing measures along the product life cycle to address resource-intensive sectors such as textiles and batteries.

To facilitate the transition to the circular economy across Europe, the EU with the preparation of new regulatory policies, is encouraging governments to implement circular economy and waste strategies in the member States by implementing measures that specifically address waste and chemicals that are key elements in improving sustainable practices in value chains.

One example of the sustainable goals set by the EU relates to the introduction of a requirement in the European Waste Directive for separate collection of textile waste in all member States as of January 1, 2025. In response to this goal, France⁵⁵ and Italy adopted circular economy and anti-waste laws, paving the way for the circular economy at the national level. Other EU countries have opted for short- or long-term circular initiatives without yet introducing specific legislation to implement circularity.

⁵² Regulation (EU) 2017/821 of the European Parliament and of the Council of 17 May 2017 laying down supply chain due diligence obligations for Union importers of tin, tantalum and tungsten, their ores, and gold originating from conflict-affected and high-risk areas. Available at: <https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEXper cent3A32017R0821>

⁵³ Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celexper cent3A32013R1380>

⁵⁴ The European Commission (2020). Circular economy action plan for a cleaner and more competitive Europe, June. Available at: <https://op.europa.eu/en/publication-detail/-/publication/45cc30f6-cd57-11ea-adf7-01aa75ed71a1/language-en/format-PDF/source-170854112>

⁵⁵ Ministère de la Transition Énergétique (2020). La loi anti-gaspillage pour une économie circulaire, February. Available at: <https://www.legifrance.gouv.fr/loda/id/JORFTEXT000041553759/>

Table 2. Advancement of European Union countries on circular economy.

| Country | Strategy for Circular Economy | Year | Description/Content |
|--------------------|---|---------------|---|
| Belgium | Towards a Belgium | 2014 | The Roadmap contains 21 measures that aim to increase the potential of the circular economy by sharing and repairing products and sustainable waste management. |
| Netherlands | National Programme Circular Economy in the Netherlands by 2050 | 2016 | The strategy aims at reducing the use of natural resources and making the import of natural resources independent, and thus increasing supply security of raw materials. It focuses on biomass and food, construction, plastics, manufacturing, and consumer goods, among others. |
| France | Action plan for moving to a circular economy and establishment of the French Circular Economy Institute. Roadmap for Circular Economy | 2013 and 2018 | The strategy for a circular economy in France presumes, i.a., a reduction of natural resource use related to French consumption: a 30per cent reduction in relation to GDP between 2010 and 2030, a 50per cent reduction in the amount of non-hazardous waste landfilled by 2025 compared to 2010, 100per cent of plastics recycled, and a reduction of greenhouse gas emissions. |
| Italy | Towards a Model of Circular Economy for Italy - Overview and Strategic Framework | 2017 | The strategy focuses mainly on horizontal tools and policies. Five parameters: production, consumption, waste management, secondary raw materials and competitiveness and innovation. |
| Spain | España Circular 2030 (the new Strategy for Circular Economy in Spain until 2030) | 2020 | The strategy contains circular economy objectives and a series of strategic orientations for the period 2020–2030. The strategy: sets up a series of objectives for 2020–2030 which will, inter alia, allow a 30per cent reduction in the national consumption of resources and a 15per cent reduction in waste generation (as compared to 2010); contributes to Spain's efforts to transition to a sustainable, decarbonized, resource-efficient and competitive economy; and takes the form of successive 3-year action plans providing for concrete measures to deliver on circular economy. |
| Sweden | Strategy for the transition in Sweden | 2020 | The Strategy contemplates the following four focus areas: 1) Circular economy through sustainable production and product design; 2) Circular economy through sustainable ways of consuming and using materials, products and services; 3) Circular economy through non-toxic and circular material cycles; and 4) Circular economy as a driving force for the business sector and other actors through measures |

| | | | |
|--|--|--|---|
| | | | to promote innovation and circular business models. |
|--|--|--|---|

Source: UNECE desk research.

Another critical challenge for the transition to a Circular Economy, is the presence of chemicals in products, especially in products with which consumers come into close and frequent contact, such as textiles. In October 2020, the European Commission adopted a Global Chemical Strategy for Sustainability⁵⁶ with the aim of preventing and eliminating hazardous chemicals from entering products from the very beginning of the design phase. The strategy also includes traceability and transparency measures to meet the challenges posed by chemicals.

The European Commission is also working to implement its Product Environmental Footprint (PEF) program⁵⁷, which, when it becomes law, will oblige companies to calculate and disclose the environmental impact of their products by tracing their origins through value chains.

On 30th March 2022 the EU published the Sustainable Products Initiative (SPI)⁵⁸, a package that comprises a proposal for a regulation on eco design requirements, a communication on products sustainability, an EU Strategy for Sustainable and Circular Textiles⁵⁹, a proposal for a directive on consumer empowerment, and a proposal for the revision of the Regulation on construction products.

The draft regulation on eco design requirements (ESPR), which would repeal the current Ecodesign Directive 2009/125, broadens the scope of products covered by the Ecodesign Directive beyond energy-related products and to broaden requirements on those products to encompass circularity and an overall reduction of products' environmental and climate footprint, in addition to energy efficiency criteria. The Regulation sets a horizontal framework with a number of obligations directed at manufacturers, authorised representatives, importers, distributors and other entities at various stages of the product lifecycle. It would apply to all physical goods intended for the EU market, including components and intermediate products, except food, feed, medicinal and veterinary products, living plants and animals, and products of human origin, that are not covered by existing legislation or where that legislation does not sufficiently address sustainability. It aims to establish ecodesign requirements answering the environmental and sustainability concerns they currently raise. Two types of requirements are expected:

1. Performance requirements demanding compliance with rules on durability, repairability, reusability, recyclability, environmental footprinting, carbon footprinting, microplastic release, presence of substances of concern, and waste generation, among others.
2. Information requirements implying that details related to a product's performance must be supplied with the product. The information may be provided on the product, packaging, label, website, or manual or in a product passport.

Selected products will have a digital passport that it is intended to meet the general requirements for providing information, such as how to install, use, maintain and repair the product and how to return or dispose of it.

Digital product passports will be the norm for all products regulated under the ESPR aiming at ensuring that products are tagged, identified and linked to data relevant to their circularity and sustainability.

For each product group, these digital passports will help to know more about products' impacts and make more sustainable choices, allow to track the presence of substances of concern throughout the life cycle of materials and products, improve transparency, support national authorities in enforcement and surveillance and advance circularity of products along the value chain. Other measures in the seek to end the destruction of unsold consumer goods. Green public procurement will also be supported through mandatory criteria in the regulation.

⁵⁶ ECHA European Chemicals Agency. Chemicals Strategy for Sustainability. Available at: <https://echa.europa.eu/hot-topics/chemicals-strategy-for-sustainability>

⁵⁷ The European Commission. The Environmental Footprint Pilots. Available at: https://ec.europa.eu/environment/eusssd/smgp/ef_pilots.htm

⁵⁸ The European Commission (2022). Proposal for Ecodesign for Sustainable Products Regulation, March. Available at: https://environment.ec.europa.eu/publications/proposal-ecodesign-sustainable-products-regulation_en

⁵⁹ The European Commission, EU strategy for sustainable and circular textiles. Available at: https://environment.ec.europa.eu/strategy/textiles-strategy_en

The EU's also unveiled the Strategy for Sustainable and Circular Textiles among the package of the 2019 European Green Deal proposals with the goal to make sustainable products the norm. Measures include a mandatory EU extended producer responsibility (EPR) scheme, ecodesign requirements for textiles^[3], actions to tackle microfibre pollution and greenwashing, and a new digital product passport. This strategy aims to make textiles more durable, repairable, reusable and recyclable, to tackle fast fashion, textile waste and the destruction of unsold textiles, and to ensure that production respects human rights.

EU legal initiatives have been put in place aiming at providing clear, trustworthy, easy to understand and verifiable information empowering consumers and enterprises to responsible consumption and production and allowing to build trust among all relevant stakeholders. On March 30th the European Commission adopted a proposal for a directive on Empowering the Consumers in Green Transition Initiative⁶⁰ that aims to make business-consumer relations fair and transparent and ultimately support the welfare of European consumers and the EU economy.

The directive strengthens consumer rights and contribute to a circular, clean and green EU economy by enabling consumers to make informed purchasing decisions and thus contribute to more sustainable consumption. The EU in fact believes that the circular economy has be achieved through better consumer participation, in particular by providing consumers with better information on the durability and repairability of certain products prior to contracting, and by intensifying consumer protection against unfair trade practices that impede sustainable purchasing, such as: greenwashing practices (i.e., misleading environmental claims), premature obsolescence practices (i.e., premature failure of goods), and the use of unreliable and non-transparent sustainability labels and information tools.

Another key policy that will impact the way information is communicated to consumers is the “Substantiating the Green Claims Initiative”⁶¹, expected in the upcoming months, a horizontal initiative that will affect different sectors.

Finally, the EU will launch the Sustainable Corporate Governance Initiative to address traceability and social issues in the value chain with the aims to help companies to better manage sustainability-related matters in their operations and value chains.

Therefore, traceability and transparency in the value chain will become essential for the assurance of compliance with upcoming European laws and regulations in the context of the transition to the Circular Economy.

The table below shows examples of measures in support of traceability and transparency asserted in regulations.

Table 3. Selected measures supporting traceability and transparency in regulations.

| Traceability and transparency drivers | Goods among the supply chain | Legislation | Type of legislation and number of laws | Type of measures |
|--|------------------------------|--|--|---|
| Product quality and claims | Textile Footwear | EU 1007/2011. Link. EU 11/1994. Link. | 2 EU Regulation | Mandatory correct, clear, visible and accessible information on composition and presence of non-textile parts of animal origin Obligations for economic operators to ensure the supply of the label and the accuracy of the information |
| Human and animal health; consumers' information | Textile | US Textile Fiber Products Identification Act (1959). Link. | 4 US Laws | Mandatory correct, clear, visible and accessible information on composition and origin (if imported) Mandatory information of economic operators |

⁶⁰ The European Commission (2022). Proposal for a Directive on empowering consumers for the green transition and annex, March. Available at: https://ec.europa.eu/info/publications/proposal-empowering-consumer-green-transition-and-annex_en

⁶¹ The European Commission, Initiative on substantiating green claims. Available at: https://ec.europa.eu/environment/eussd/smgp/initiative_on_green_claims.htm

| | | | | |
|--|--|--|--|--|
| | | <p>US Fur Product Labeling Act (2010). Link.</p> <p>US Care Labeling of Textile Wearing Apparel (2000). Link.</p> <p>US Wool Products Labeling Act (1939). Link.</p> | | |
| Human life and health; consumers' information | Food Animal by products ^[4] | <p>EU Regulation 931/2011. Link.</p> <p>EU Regulation 1069/2009. Link.</p> <p>EU Regulation 178/2002. Link.</p> <p>US Safety Modernization Act (2011). Link.</p> | <p>3 EU Regulations</p> <p>1 US Law</p> | <p>Mandatory traceability system</p> <p>Mandatory information on labeling</p> <p>Additional voluntary information on labeling</p> <p>Eco labeling reporting</p> <p>Risk management</p> <p>Obligations for economic operators</p> |
| Safety | Non-food products; personal protective equipment; toys | <p>EU Regulation 2016/425. Link.</p> <p>Directive 2009/48/EC. Link.</p> <p>Directive 2001/95/EC. Link.</p> <p>US Consumer Product Safety Improvement Act (2018). Link.</p> | <p>1 EU Regulations</p> <p>2 EU Directives</p> <p>1 US Law</p> | Traceability and standards of quality and safety |
| Animal health and welfare | Fish; seal | <p>EU Regulation 1379/2013. Link.</p> <p>EU Commission Regulation 2065/2001. Link.</p> <p>EU Council Regulation 1224/2009. Link.</p> <p>EU Council Regulation 1005/2008. Link.</p> | 4 EU Regulations | <p>System for identification of fishery and seal products</p> <p>Obligations for economic operators</p> |
| Preservation | Timber | <p>EU Regulation 995/2010. Link.</p> <p>US Lacey Act (1900). Link.</p> | <p>1 EU Regulations</p> <p>1 US Law</p> | <p>Mandatory due diligence</p> <p>Obligations for economic operators</p> |
| Product quality and safety | Beef | EU Regulation 1760/2000. Link. | 3 EU Regulations | <p>System for identification and registration of bovine animals</p> <p>Mandatory labelling requirements</p> |

| | | | | |
|--|----------------------------|---|-----------------|---|
| | | EU Regulation 1825/2000. Link. EU Regulation 275/2007. Link. | | |
| Organic claims | Organic products | EU Regulation 848/2018. Link. | 1 EU regulation | Mandatory labeling requirements and control of organic production |
| Human life and health; sustainability related information | Food and non-food products | French Anti waste Law (2020). Link. | 1 national law | Mandatory environmental or social labeling Recyclability and reparability information Recycling and re-use obligations for economic operators |

Source, UNECE desk research (2022).

3.3. Traceability and circularity landscape in the UNECE programme countries region

The progress in enhancing the traceability as well as the circular economy frameworks is evident in member States of the EU but the concept of traceability as an instrument for the circular economy transition is not well known in the UNECE programme countries. Even if the European Commission is driving the process, in some countries traceability legislation is at the early stage of formulation, and relevant laws and policies are still expected to be adopted at the national level.

The role of the EU in promoting traceability and circularity in the UNECE region is significant. For example, improvement of the traceability and labelling of food products to ensure food safety, improve consumer information and promote sustainable food is one of the priorities of the Sofia Declaration on the Green Agenda for the Western Balkans.⁶² Its Action plan initiates establishment of the Regional Expert Advisory Working Group on the Green Agenda for the Western Balkans together with two subgroups.⁶³ The subgroup Organic will support the process on introduction of control and traceability of organic farming and products.

In general, the traceability landscape for the circular economy transition has been transforming at a faster pace in those UNECE programme countries that are the EU candidate countries, such as Albania, Serbia, and Türkiye, as well as countries that participate in the regional economic integrations, such as the Eurasian Economic Union (Box 1).

National approaches to the traceability frameworks in the UNECE region vary. Consultations with national stakeholders and the desk analysis revealed that most of the traceability provisions are included in the food safety guidelines. Some examples are presented in Table 4.

Box 1: Examples of traceability approaches in UNECE programme countries.

In **Albania** the requirements for traceability of agrifood value chains are included in the regulations that follow the Law of the Republic of Albania dated January 28, 2008, No. 9863 "On food"⁶⁴. Article 25 of this law lists the requests for a system of self-control, which is based on the Hazard Analysis and Critical Control Point (HACCP) definition. Food business operators are obligated to register the needed information and prepare annual reports that are stored in regional departments of the Ministry of Agriculture. The information can be preserved in hard copy or electronic copy, but there is no obligation to choose one method over the other. Food must be labelled, identified through documents and any other type of information to ensure traceability. The requirements for

⁶² Sofia Declaration on the Green Agenda for the Western Balkans, 10 November 2020. Available at:

<https://www.rcc.int/docs/546/sofia-declaration-on-the-green-agenda-for-the-western-balkans-rn>

⁶³ Action Plan for the Implementation of the Sofia Declaration on the Green Agenda for the Western Balkans 2021-2030, 4 October

2021, Sarajevo. Available at: <https://balkangreenenergynews.com/wp-content/uploads/2021/10/GAWB-ACTION-PLAN-Final-04.10.2021.pdf>

⁶⁴ Law of the Republic of Albania dated January 28, 2008, No. 9863 "On food". Available at: <http://aku.gov.al/wp-content/uploads/2016/06/Ligji-Nr-9863-datë-28-1-08-i-ndryshuar-me-26.03.20013.pdf>

traceability are determined by a decision of the Council of Ministers on the proposal of the Minister of Agriculture.

In **Armenia** the Strategy of the Main Directions Ensuring Economic Development in Agricultural Sector for 2020-2030⁶⁵ provides for development of a full-fledged food traceability system based on the principle "from the consumer to the field". The introduction of such a system to ensure the traceability of agricultural products is indicated as a priority of the Armenian Government.

In **Belarus** Decree of the President of the Republic of Belarus dated December 29, 2020, N 496 "On the traceability of goods"⁶⁵ establishes that traceability is applicable to transactions with goods subject to information interaction with the member States of the Eurasian Economic Union. Collection, accounting, storage, processing, and control of information are carried out in the software package "Traceability system of goods" AIS "Calculation of taxes".

In **Serbia** the Law "On Food Safety"⁶⁶ defines traceability as the ability to trace a food, feed, food-producing animal, raw material, or substances intended to be, or expected to be incorporated into food or feed, in all stages of production, processing and circulation. Any food or feed business operator shall identify each operator from which it procures and to which it supplies food, feed, or food-producing animals. The law requires operators to establish a system and procedures which provide for availability of the traceability data. Control whether food or feed business operator has ensured traceability is enforced by state administration authorities, such as veterinary, phytosanitary, and agricultural inspections. The law also contains articles that regulates traceability and marking of novel food, genetically modified food, and feed. Penalty for non-compliance with the law amounts from 150,000 to 1,000,000 Dinars (about 1.3k – 8.5k USD) for legal persons, and from 5,000 to 30,000 Dinars (about 50 – 250 USD for a natural person).

In **Türkiye** the Regulation of the Ministry of Industry and Technology "On Market Surveillance and Inspection" requires that economic operators regularly keep records of the name, trade name or brand and contact information of the previous and, if any, the next economic operator in the supply chain and other information that will facilitate the follow-up of the product. They keep them for at least ten years as of the date and submit them to the Ministry upon the request. When corrective measures need to be taken within the scope of the Regulation, economic operators shall create a record containing the distributors to whom the product is distributed based on serial, batch or lot and the amount of the product distributed and submit these records upon the request of the Ministry.

Table 4. Selected examples of traceability framework in UNECE programme countries.

| Country | Sector | Responsible authority | Legislative frameworks |
|---------|--|--|---|
| Albania | Agrifood | Ministry of Agriculture, Food and Consumer Protection of the Republic of Albania | Law of the Republic of Albania dated January 28, 2008, No. 9863 "On food". Link . |
| Armenia | Agrifood | Ministry of Economy of the Republic of Armenia | The Strategy of the Main Directions Ensuring Economic Development in Agricultural Sector of the Republic of Armenia for 2020-2030". Link . |
| Belarus | In respect of goods that are subject to information interaction among member states of the Eurasian Economic Union | Ministry of Taxes and Duties of the Republic of Belarus | Decree of the President of the Republic of Belarus dated December 29, 2020, N 496 "On the traceability of goods". Link . Decree of the President of the Republic of Belarus dated June 10, 2011, No. 243 "On the labelling of goods". Link . |

⁶⁵ Decree of the President of the Republic of Belarus dated December 29, 2020, N 496 "On the traceability of goods". Available at: <https://www.alta.ru/tamdoc/20b10496/>

⁶⁶ The Law of the Republic of Serbia dated May 29, 2009, "On Food Safety" ("Official Gazette R.S." No.41/09). Available at: <http://www.minpolj.gov.rs/dokumenti/zakoni/>

| | | | |
|------------------------|----------------------|--|---|
| | | | Decree of the Council of Ministers of the Republic of Belarus dated July 29, 2011, No. 1030 " On goods subject to labelling ". Link . Decree of the National Academy of Sciences of Belarus, the Ministry of Finance of the Republic of Belarus, the Ministry of Taxes and Dues of the Republic of Belarus and the Ministry of Communications and Informatization of the Republic of Belarus dated December 19, 2019, No. 12/76/42/20 " On approval of the structure and format of electronic invoices ". Link . |
| Belarus | Agrifood | Ministry of Agriculture and Food of the Republic of Belarus | Law of the Republic of Belarus dated July 15, 2015, No. 287-Z " On the identification, registration, traceability of animals (herds), identification and traceability of products of animal origin ". Link . |
| Bosnia and Herzegovina | Agrifood | Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina | The Law of Bosnia and Herzegovina dated September 11, 2004, No. 50/04 " On food ". Link . |
| Serbia | Agrifood | Ministry of Agriculture, Forestry and Water Management | The Law of the Republic of Serbia dated May 29, 2009, " On Food Safety " ("Official Gazette R.S." No.41/09). Link . |
| Türkiye | Cross-cutting | Ministry of Trade of the Republic of Türkiye | Regulation " On Market Surveillance and Inspection " dated 1 April 2020. Link . |
| Türkiye | Cross-cutting | Ministry of Industry and Technology of the Republic of Türkiye | Regulation " On Market Surveillance and Inspection " dated 14 July 2021. Link . |
| Uzbekistan | Garment and footwear | Ministry of Agriculture | Decree of the President of the Republic of Uzbekistan dated 21.01.2022 № UP-53 " On measures to promote the deep processing, production, and export of high-value manufactured products by textile, sewing and knitting enterprises ". Link . |

Source: UNECE desk research and consultation with national focal points (2022)

The tables below provide measures that have an impact on the development of sustainable practices and the transition to a circular economy in the targeted sectors.

Table 5. Selected policies supporting traceability, transparency, sustainability and circularity in the minerals sector.

| | |
|-----|---|
| USA | <p>The U.S. National Recycling Strategy, which is part one of a series on building a circular economy for all. Link. US Dodd Frank Act Section 1502. Link.</p> <p>The U.S. National Recycling Strategy. Link.</p> <p>The Save Our Seas 2.0 Act. Link.</p> <p>Infrastructure Investment and Jobs Act</p> |
|-----|---|

| | |
|--------|---|
| Canada | <p>The Canadian Minerals and Metals Plan (2019) aiming at: reducing the mining sector’s environmental footprint; transforming mine waste into useful products, with enhanced mine closure planning and environmentally-reclaimed mine sites; and systemic climate change adaptation planning. Link.</p> <p>Green Mining Initiative, with the goals to reduce the environmental impacts of mining and to improve Canada’s competitiveness in four main priority areas: energy efficiency, enhanced productivity, waste management, and water management. Link.</p> |
|--------|---|

Source: UNECE desk research (2022).

Table 6. Selected policies supporting foods traceability, transparency, and circularity.

| | |
|--|---|
| Italian Gadda Law. Link . | Adopted in 2016, this law encourages businesses to give surplus food away for free through tax breaks, campaigns, and the streamlining of bureaucracy. |
| EU Landfill Directive 2003/33/EC. Link . | Adopted in 2003 and amended in 2018 it calls for a reduction in the amount of biodegradable municipal solid waste disposed to landfill. |
| EU Circular Economy Action Plan. Link . | Adopted in 2020, contains a section specifically pertaining to how circular economic practices can be implemented to better Europe’s food, water, and nutrient resources. |
| Nova Scotia’s landfill ban. Link . | Announced in 2017, placed a landfill ban on compostable organic material. |

Source: UNECE desk research (2022).

Table 7. Selected policies supporting garment and footwear traceability, transparency, and circularity.

| | |
|--|--|
| Regulation (EU) No. 1007/2011 on textile fiber names and related labelling and marking of the fiber composition of textile products. Link . | Harmonised provisions on the labelling and marking of textile products to eliminate barriers to the internal market in the textile sector and to guarantee consumers adequate information. |
| Regulation (EC) No. 66/2010 on the EU Ecolabel. Link . | <p>Voluntary label applicable to products with a low environmental impact throughout their life cycle from the extraction of raw material through to production, use and disposal.</p> <p>Ecolabel requirements must be independently assessed and verified. They concern the use of biocides, water consumption and water discharge, air emissions and the use of hazardous substances. It also covers product safety requirements for the consumers.</p> |
| Communication COM (2013) 196 final “Building the Single Market for Green Products” and Recommendation 2013/179/EU on the use of common methods to measure and communicate the life cycle environmental performance of products and organizations. Link . | Common methods to measure and communicate the life cycle environmental performance of products and organisations. |
| Regulation (EC) No. 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency. Link . | Regulates the manufacture, import, marketing and end use of chemicals. It applies to chemicals companies as well as textile manufacturers, tanners and shoemakers, using colorants, auxiliaries, adhesives and other substances needed to transform a raw material into a marketable finished product. |

| | |
|--|--|
| <p>Regulation (EU) No. 528/2012 concerning the making available on the market and use of biocidal products. Link.</p> | <p>It concerns the marketing and use of biocides and respect for its provisions by the sector is necessary if products such as leather or textiles have been added with biocides.</p> |
| <p>Directive 2010/75/EU on industrial emissions (integrated pollution prevention and control). Link.</p> | <p>It brings together seven previous legislative acts on industrial emissions and establishes rules to prevent and control pollution in the atmosphere, water and soil and to avoid the production of waste coming from industrial plants. The plants that fall within the scope of application of the Directive can operate only if they are in possession of an authorization, and the EU Commission's conclusions on the best technologies available for each sector are the reference for establishing the conditions of authorization. For the textile sector, the Integrated Pollution Prevention and Control (IPPC) Reference Document on Best Available Techniques for the Textiles Industry was adopted in 2003 and is currently under review.</p> |
| <p>Directive 2008/98/EC on waste amended by Directive (EU) 2018/851. Link.</p> | <p>It sets up a legislative framework for the handling of waste:</p> <ul style="list-style-type: none"> • obligation to handle waste in a way to protect the environment and human health, • in application of the polluter-pays principle, the requirement that the costs of disposal of waste are borne by the holder of waste, by previous holders or by the producers of the product from which the waste came, • separate waste collection for textiles, including a deadline for implementation, i.e., 1 January, 2025, • targets for the recycling of municipal waste, with a consequent impact on textiles, given that textiles fall under the new definition of "municipal waste", • charges and restrictions for the landfilling and incineration of waste, • incentives for the application of the waste hierarchy, • sustainable public procurement to encourage better waste management and the use of recycled products and materials, • fiscal measures to enhance recycle and re-use, • incentives for local authorities to promote waste prevention and intensify separate collection schemes and extended producer responsibility schemes. <p>Measures to:</p> <ol style="list-style-type: none"> (i) promote and support sustainable production and consumption models; (ii) encourage the design, manufacturing and use of products that are resource-efficient, durable, repairable and re-usable, (iii) encourage, as appropriate and without prejudice to intellectual property rights, the availability of spare parts, instruction manuals, technical information, or other instruments, equipment or software enabling the repair and re-use of products without compromising their quality and safety, (iv) reduce waste generation in processes related to industrial production and manufacturing, taking into account best available techniques, (v) promote the reduction of the content of hazardous substances in materials and products, (vi) reduce the generation of waste, in particular waste that is not suitable for preparing for re-use or recycling, (vii) identify products that are the main sources of littering, notably in natural and marine environments, and take appropriate measures to prevent and reduce litter from such products. |

| | |
|--|--|
| | <p>According to Article 9 (1)(d) Member States shall also encourage the re-use of products and the setting up of systems promoting repair and re-use activities, including in particular for textile, as well as packaging. It is necessary to ensure that “waste is valued as a resource” and to facilitate “the transition to more sustainable material management”.</p> |
| <p>Directive 1999/31/EC on the landfill of waste amended by Directive (EU) 2018/850. Link.</p> | <p>By 2035 municipal waste disposed of in landfills must be reduced to a maximum of 10per cent of the total municipal waste, including textile waste.</p> |
| <p>Directive 94/62/EC on packaging and packaging waste amended by Directive (EU) 2018/852. Link.</p> | <p>Introduction in the Packaging and Packaging Waste Directive of an overall recycling target of 65per cent of materials by 2025 and 70per cent by 2030 is certainly relevant.</p> |
| <p>Communication COM (2014) 0398 “Towards a circular economy: A zero waste programme for Europe”. Link.</p> | <p>It highlights that some EU policies and instruments already provide tools and incentives in line with the circular economy model. The waste hierarchy that underlies EU waste legislation is leading progressively to adoption of the preferred options of waste prevention, preparation for re-use and recycling, and discourages landfilling.</p> |
| <p>EU Action Plan for the Circular Economy (2020). Link.</p> | <p>It provides for horizontal and vertical measures to be taken forward in line with the better regulation principles, including where appropriate an impact assessment.</p> <p>It provides a consistent framework to measurably:</p> <ul style="list-style-type: none"> • Reduce the carbon, water and waste impacts of EU clothing. • Prevent waste in the clothing supply chain and the use of domestic clothing and workwear by business, consumers, and governments. • Ensure that less low grade clothing goes to incineration or landfill. • Encourage innovation in resource-efficient design and service models to encourage business growth in the clothing sector and its supply chain. |
| <p>EU Strategy for Sustainable and Circular Textiles (2022). Link.</p> | <p>The Strategy sets out the vision and measures to ensure that by 2030 textile products placed in the EU market are long lived and recyclable, made as much as possible of recycled fibers, free of hazardous substances and produced in respect of human rights and the environment. The measures include eco design requirements, a digital product passport, a mandatory extender producer responsibility scheme.</p> |
| <p>Proposal of a Regulation on eco-design requirements (2022). Link.</p> | <p>The Regulation would establish a general framework for setting ecodesign requirements for sustainable products, repealing rules currently in force which concentrate on energy-related products only. The regulation would lay down rules that would apply to all products on the internal market, with the aim of making them more durable, reusable, repairable, upgradable, recyclable and generally less harmful to the environment. The regulation would include rules on a digital product passport, green public procurement and banning the destruction of unsold goods.</p> |
| <p>Proposal of a Directive on Empowering Consumers for the Green Transition (2022). Link.</p> | <p>The proposal is designed to enhancing consumer rights in making informed choices in order to play an active role in the transition to a climate-neutral society. It proposes new rules to provide consumers with information on products’ sustainability, in particular their durability and reparability, at the point of purchase. It also aims to promote commercial guarantees exceeding the two-year legal guarantee, as well as to ban false and misleading green claims (‘greenwashing’) and certain types of premature obsolescence of products.</p> |

Source: UNECE desk research (2022).

4. Circular approaches in sustainable value chains

4.1. Benefits and challenges of making value chains circular

Moving towards circularity in the UNECE region could bring both opportunities and challenges.

Opportunity of a transition to a circular economy include managing the supply risks with efficient use of resources, cost savings related to the efficient use of resources, enhanced security of supply, reduced pressures on the environment, creation of new jobs and business opportunities, reducing materials use, redesigning materials to be less resource intensive, recapturing waste as a resource that can serve as feedstock to manufacture new materials and products and fostering sustainable consumption. There also are opportunities to recover critical minerals from recaptured wastes to build and strengthen value chains.

There are also several challenges, particularly for SMEs, to the achievement of a circular economy. They can be divided into three main types:

- Supply chain and business operations challenges,
- Economic challenges,
- Policy and regulatory challenges.

The resolution of these challenges should be accompanied by complementing interventions (see tables below).

Table 8. Value chain, business operations challenges and enablers.

| Value chain and business operations challenges | Enablers |
|---|---|
| Value chain transparency | Traceability systems Minimum mandatory requirements on traceability and transparency Adoption of digital traceability tools |
| Lack of access to sustainable materials | Knowledge of which materials are more sustainable Collaboration between brands, suppliers and producers |
| Competition with large companies | Cooperation between SMEs/sharing knowledge and consultants |
| Lack of consumer awareness on sustainable production consumption | Education and consumer awareness campaigns Environmental labelling |
| Lack of support networks and circularity hubs | Dedicated hubs/forums to promote diffusion of knowledge and best practices |
| Infrastructures for reuse and recycling | Investment in R&D to scale up technologies |
| Lack of knowledge of what is a circular economy | Guidelines on how to apply circular economy principles |
| Lack of skills | Training |

Source: UNECE desk research (2022).

Table 9. Economic challenges and enablers.

| Economic challenges | Enablers |
|-----------------------------------|---|
| Lack or weak of incentives | Grants and subsidies, particularly for SMEs, which work on sustainability and circularity initiatives |
| High start-up costs | Financial support for designers and businesses working on sustainability and circularity initiatives |

| Economic challenges | Enablers |
|---|--|
| Lack of rewarding | Taxes and penalties for non-sustainable operations/products EPR Schemes |
| Lack of funding to support reskilling | Reskilling programmes |
| Lack of understanding of circular business models | Financial incentives for collaborative consumption |
| Lack of participation of women | Financial instruments which encourage women entrepreneurs |

Source: UNECE desk research (2022).

Table 10. Policy and regulatory challenges and enablers.

| Policy and regulatory challenges | Enablers |
|---|--|
| Lack of sustainability criteria/requirements for products to facilitate circularity | Clear criteria for sustainable products Environmental labelling |
| Administrative barriers | Tax reductions Industry agreements |
| Lack of definitions and occurrence of gaps in legislation | Harmonised legislation across the UNECE region |
| Lagging or incomplete implementation or enforcement of legislation | Monitoring and enforcement mechanisms |
| Different and conflicting implementations of a legislation | Capacity building and inter-ministerial coordination |
| Lack of incentives and financial support for sustainable players | Green Public Procurement/Circular Procurement Economic instruments (e.g. taxation, preferential tariffs for sustainable and circular products, Grants and subsidies) Mandatory EPR Schemes |
| Lack of common standards | Minimum standards for sustainability practices Voluntary adoption of Product Environmental Footprints (PEF) |
| Lack of business knowledge and awareness of available funding options | Guidelines and training programs |

Source: UNECE desk research (2022).

4.2. Case studies and best practices in the UNECE region

Sustainable development is key and a holistic framework for industry development and cooperation with local and international organisations is needed.

Industries can in fact lead the way to circularity developing sustainable products and focusing on production that reduce impacts and use of natural resources. The targeted sectors have tremendous potential to recapture lost economic value and become more circular.

“Circularity is needed for effective utilization of national resources.” Tajikistan

Organizations are already implementing a wide range of practices for establishing commitment to resource development in a socially and environmentally responsible manner that support circular economy objectives and strategies. Minerals, agrifood, and garment and footwear organizations have begun to invest in implementing circular

solutions to address the sector's greatest challenges, such as increasing efficiency, providing cleaner inputs, reducing waste, and reclaiming and recycling post-consumer minerals, food, garments, and footwear.

“Uzbekistan’s full-cycle industrial capacity must be enhanced with traceability, transparency, circularity and sustainability to become unique industry with high value-added products to take a high role in the future of the global market by the only way of doing so.” [Uzbekistan](#)

However, a more wide-spread adoption of such practices is needed to reduce the current levels of food, minerals and garments loss and waste and to meet the growing demand for food, minerals, and garments.

The boxes below show a selection of best practices employed in the minerals, agrifood, and garment and footwear sectors. They represent a starting point in the journey towards a circular economy and can be used as a reference source for organizations that want to participate in the transition and to support the development of a mineral, agrifood, and garment and footwear sector roadmap to a circular economy.

Box 2: Circular business practices in the minerals sector.

Mineworx Technologies Ltd⁶⁷ (in joint partnership with [EnviroLeach](#)⁶⁸) reduces its operational footprint and energy consumption through the use of the HM X-leach, an innovative new eco-friendly technology which offer cyanide-free precious metals extraction. It has developed a process which combines water clarification and filtration technologies to allow operators to recycle most of the process water used at a typical mine site. This conserves water, minimizes environmental discharge and significantly reduces or eliminates the necessity for tailings ponds.

Rio Tinto⁶⁹ has achieved gains in mining automation through the Mine of the Future program. The program was founded to help the company find innovative ways of extracting minerals while reducing environmental impacts and improving worker safety.

Elysis^[15] is a Canadian company that developed a new technology which eliminates greenhouse gas emissions from the aluminum smelting process and is the first technology ever that emits pure oxygen as a by-product.

ZeroBrine^[16] piloted a project in Poland which aims to decrease the energy consumption by 50per cent compared to the energy consumption of a reverse osmosis-vapour compression system which represents current best practice.

Tomra Systems^[17] is delivering a sensor-based ore sorting system^[17] for dry material separation of various ores and minerals, in addition to enabling metal recovery from slag.

ETF Equipment^[18] redesigns extraction equipment to facilitate reuse and repair. The modular designed vehicles feature components that can be removed from the vehicle for maintenance and repairs without bringing the entire truck to the shop.

Harmony^[19] rehabilitates mine sites for the cultivation of bio-crops to generate renewable bioenergy to be used as a substitute for polyfuel.

Weir Minerals^[20] is helping its clients find more sustainable solutions for mine tailings using the Weir Technical Centre (WTC).

⁶⁷ CISION, *Loop and Loblaw to Bring Circular Shopping Platform to Canada*, 2019. Available at: <https://web.archive.org/web/20190729200239/https://www.newswire.ca/news-releases/loop-and-loblaw-to-bring-circular-shopping-platform-to-canada-868732954.html>

⁶⁸ Lufa Farms. Homepage. Available at: <https://web.archive.org/web/20190729200838/https://montreal.lufa.com/en>

⁶⁹ City of Guelph, *50x50x50 by 2025: Creating Canada's first circular food economy*. Available at: https://web.archive.org/web/20190729201450/https://guelph.ca/wp-content/uploads/SmartCities_Booklet.pdf

Box 3: Circular business practices in the agrifood sector

Türkiye Circular Economy Platform guide companies in the circular transition in textile, plastics, metal, food, and construction industries^[21] **Türkiye Material Marketplace (TMM)**^[22] is an industrial symbiosis network and a platform for industrial material exchange in the country. It was established in 2016 by the Business Council for Sustainable Development Türkiye (BCSD Türkiye) with the financial support of the European Bank for Reconstruction and Development. This is an award-winning platform that won a Digital Disruptor Award of the World Economic Forum in 2016. TMM constantly works on identifying all possible synergies that have the potential of creating value by reusing residual materials, on matching companies from different sectors in line with the information they have provided on their initial survey and follow-up correspondence. 17 of these synergies were carried out into completed transactions that recovered 13 thousand tonnes of materials with an estimated value of 1.4 million Euro including savings and revenues. In 2020 TMM has evolved into one of the key components of the Türkiye Circular Economy Platform (TCEP). TCEP is putting the past 5 years of experience into action. TCEP has analysed the circular economy potential of the major sectors in Türkiye and has prioritized textile, plastics, metal, food, and construction. TCEP has started in depth sectoral work for each of these sectors to guide companies in their transition from linear to circular. TCEP also provides Circular Business Design training courses to companies to shed light on the opportunities of going circular and the risks of staying linear.

Westburny Street Holdings is a UK company that supports sustainable value chain management from agricultural suppliers to restaurants and grocery stores. They work with producers that meet or exceed environmental standards as a part of accreditation schemes.

The ‘Re-Imagine Food’ Campaign^[23] is a campaign from the City of Guelph in Canada aiming at educating citizens on the real costs of food waste, increasing demand for circular economy productions, and building stronger relationships between food producers and consumers.

FoodSharing^[24] is an online platform that saves and distributes surplus food in Germany and Austria. It is entirely volunteer run. Any individuals, retailers and producers can offer or collect food that would otherwise be thrown away. Food must be passed on for free before its expiry date.

BEES Coop⁷⁰ is a cooperative supermarket in Brussels that supports local production and sell ecologically-grown and seasonal products. Consumer are a co-operators that commit themselves to work at the supermarket for 3 hours per month and in return they can shop at the supermarket. The cooperative also incentivise bulk food to reduce packaging waste and promote food saving behaviour.

FoodHero^[26] is an app run that allows customers to purchase food that is nearing expiry. The app also tracks the amount of money saved by the customer from purchasing discounted food, as well as the amount of CO2 emissions that have been curbed from avoiding food waste.

We-Food^[27] is a charitable organization in Denmark that operates a supermarket selling food that is past the best before date. Operated by volunteers, We-Food has diverted an estimated 125 tonnes of food by 2016 from Danish landfills.

Loblaws partners with Flashfood^[28] is a canadian app that allows customers to purchase food items nearing expiration at a reduced price of up to 50per cent off at select Loblaws grocery stores.

Waste and Resources Action Programme’s (WRAP) Love Food Hate Waste Campaign^[29] is a UK food waste reduction campaign introduced in 2007 that helped cut 21per cent of household food waste in its first five years. Since its launch, it has helped save UK consumers 13 billion pounds by teaching people how to reduce food waste.

Winnow^[30] is an international software company that enables large commercial kitchens to monitor their food waste. It helps identify why and where waste is happening so that appropriate operational decisions can be

⁷⁰ BeesCoop Supermarket. (2019). Homepage. Available at: <https://web.archive.org/web/20190729202859/https://bees-coop.be/en/>

made to minimize it. IKEA installed Winnow in 35per cent of their kitchens and saved an estimated 1 million meals within a few months.

Agroforestry^[31] is an agriculture technique widely used in Brazil and other parts of South America. It refers to any technique that combines forestry with agriculture or livestock. Forest management, e.g., pruning, produces organic matter that nourishes the soil and helps crops grow. The resulting system is highly biodiverse and productive.

Arla Foods dairy farm^[32] in Denmark uses the heat of milk to heat the underfloor of the farmhouse. Warm air is generated when the fresh milk from the cows is cooled from 37°C to 4°C. It is then pumped from the milk tank to the farmhouse.

Nu Grocery⁷¹ is an Ottawa-based grocery store that strives to eliminate packaging waste. Customers bring reusable containers to the store which they can then fill with the exact quantity of goods they wish to purchase.

3D Ocean Farming by GreenWave⁷² is an American organization spearheading vertical farming made possible by 3D printed structures to grow scallops, clams, oysters, seaweeds, and kelps at different depths of the water column. Thimble Island Ocean Farm applies this technique and produces 30 tonnes of seaweed and 250,000 shellfish every five months. Farming less than 5per cent of US waters with this technique could sequester 135 million tons of carbon and 10 million tons of nitrogen.

Seawater Farming^[35] is an innovative technique that addresses the lack of freshwater and undesirable soil conditions in coastal regions. The technique was successfully applied to create a productive fish farm in Eritrea.

The Provision Coalition^[36] is an organization in Guelph, Ontario that aids food and beverage companies increase their revenues through the implementation of sustainable practices. This is done through increasing revenue streams, finding methods to reduce costs and elevating brands through greater transparency.

A Tablee des Chefs⁷³ is a Montreal-based program that began in 2012 by providing culinary educations to youth but quickly expanded to developing a food recovery program. They launched programs in Vancouver, Calgary, France, and Mexico, recovering almost 250,000 portions of food in 2013 alone. • **Agriprotein**⁶⁸ is a South African company that uses Black Soldier fly larvae fed on discarded organic waste material to produce highly nutritious feed, nutrient rich compost, and oil. **Arla Foods**⁷⁴, a dairy company in Scandinavia, sends 100per cent of their food waste no longer fit for human consumption from their largest factory to animal feed instead of anaerobic digestion.

BioBean⁷⁵ in the UK is the first company to industrialize the process of recycling waste coffee grounds into biomass heating briquettes and pellets. It heads the world's first coffee recycling factory⁷² and is researching biochemicals made from coffee grounds.

McDonalds France⁷⁶ collects used cooking oil from its restaurants and transports it to a processing plant to make biofuel. The trucks that collect the cooking oil run on the produced biofuel.

⁷¹ Nu Grocery. Our Story. Available at: <https://web.archive.org/web/20191218012931/http://nugrocery.com/our-story/>

⁷² GreenWave. (2019). Our Work. Available at: <https://web.archive.org/web/20190729200611/https://www.greenwave.org/our-work>

⁷³ La Tablee des Chefs . (n.d.). History. Available at: <https://web.archive.org/web/20200618222046/https://www.tableedeschefs.org/en/history/>

⁷⁴ Arla. (2019). Sustainable Dairy Production. Available at: <https://web.archive.org/web/20190729204703/https://www.arla.com/company/responsibility/sustainable-dairy-production/>

⁷⁵ Bio-Bean. (2019). About Us. Available at: <https://web.archive.org/web/20190729205103/https://www.bio-bean.com/about-us/>

⁷⁶ Veolia. (2018). In Lyon McDonalds's trucks run on recycled burgers! Available at: <https://web.archive.org/web/20190729205714/https://www.livingcircular.veolia.com/en/industry/lyon-mcdonalds-trucks-run-recycled-burgers>

All You Need Is Food⁷⁷, is an awareness campaign in Italy to promote circular behaviour to reduce food waste. In response to environmental and social damages created by food waste, the Italy UNC consumers' association has decided to provide a series of nationwide services and activities, investing in innovative tools that promote the information needed to curb daily food waste.

The German consortium **CIRCULAR FoodPack**⁷⁸ is working on solutions to enable the circular use of plastic packaging, focusing on food. The project aims to develop recyclable packaging with at least 50 per cent post-consumer recyclates incorporated behind a functional barrier.

Coffeefrom⁷⁹ is an innovative project from Italy, the second circular economy project run by Il Giardinone Cooperativa Sociale. It has built a supply chain based on the recovery and processing of industrial coffee grounds. Coffee grounds from the food industry are blended with biopolymers to become a new bio-based material that is a durable and resistant alternative to single-use plastic.

Cargo Carousel System^[41] concept is to replace wooden pallets with reusable, recyclable, cubic "Smart Modules" that would monitor inventory and provide critical data to stakeholders. The idea is to suspend cubic modules from an over/under carousel, much like the "gondolas" of a Ferris Wheel, housed in its own framework and mounted into an intermodal steel shipping container or truck trailer to create an automated storage and retrieval system that is mobile. The modules would move forward/backward the entire length of the container/trailer on two levels to fully utilize the space and each cubic module would be customizable to dramatically reduce excess packaging and freight damage. When combining digital technologies (IoT with DLT/Blockchain, AI, Cellular/Satellite ICT) with autonomous robotics, changes supply chains into supply "networks" for further standardization.

Box 4: Circular business practices in the garment and footwear sector.

Manteco⁸⁰ is an Italian organization, that pursued many circular economy projects and responsible methods to create new collections, which are based on designing out waste, keeping products and materials in use and regenerating natural systems. Project 43⁸¹ is a traceable project based on circular economy principles. Its purpose is to optimise existing materials and promote "Zero Waste" practices by recovering offcuts from the garment manufacturers that use Manteco's fabrics and regenerating them into "new" luxury fabrics. The project optimises leftovers from garment making processes from any manufacturer, not just Manteco. This includes fabrics as well as other textile elements, such as knits. These materials are gathered and regenerated through a simple procedure, eventually creating a new luxury fabric.

Vitelco Leather⁸², from the Netherlands, has launched a 100 per cent fully traceable calfskin leather from birth to finished product.

ISATIÓ is a Brussels SME that recovers samples from the textiles industry to create unique designer clothing, with manufacturing all done locally and the supply chain covered entirely by bicycle couriers.

Cork-A-Tex⁸³ is a Portuguese project that uses recycled cork to create a yarn with high incorporation of cork. Cork is a 100 per cent natural material made from the oak cork trees which can be recycled after its use as cork stopper in wine bottles.

⁷⁷ UNC. Homepage. Available at: <https://www.udicon.org/2019/07/08/all-you-need-is-food-informare-per-prevenire-il-food-waste/>

⁷⁸ Fraunhofer. Homepage. Available at: <https://www.fraunhofer.de/en.html>

⁷⁹ Il Giardinone Cooperativa Sociale. Homepage. Available at: <https://www.ilgiardinone.it/>

⁸⁰ Manteco. Homepage. Available at <https://manteco.com/circular-economy-practices/>

⁸¹ Manteco, "Project43: the traceable circular economy project", available at <https://manteco.com/project/project-43/>

⁸² Vitelco. Homepage. Available at: <https://www.vitelco.nl/de/aktuelles/vitelco-reveal-s-fully-traceable-calf-leather/#:~:text=Theper cent20divisionper cent20ofper cent20Dutch,isper cent20marketedper cent20asper cent20ReVeal'>

⁸³ Cork-A-Tex. Homepage. Available at: <https://www.cork-a-tex.com/about-cork-a-tex/>

CelluTex⁸⁴, is a Swedish advocacy platform from a private-public partnership that promotes needed actions to ensure production of cellulose-based textiles in Europe, utilizing forest resources and recycled cellulosic textiles, including cotton, as raw materials.

Quid⁸⁵, Italian social cooperative, provides jobs for vulnerable people, especially women, in a field for which Italy is renowned: fashion. Quid markets its ethical and sustainable clothing under the label Quid Project. The project sources the raw material from the Italian fashion and textile world, using production surpluses and end-of-series fabrics. It therefore combines social and environmental impact.

Van Hulley⁸⁶ is a Dutch SME that upcycles worn-out shirts into boxershorts, employing disadvantaged women as seamstresses every year and training them to join the labour market more permanently.

The **Mistra Future Fashion research program**⁸⁷ uses the expertise of the entirety of the textile value chain to highlight challenges and solutions to make fashion more sustainable. It publishes reports and peer reviewed articles that focus on how exactly this industry can be made more "circular".

The Italian **Cartiera**⁸⁸ is an ethical fashion workshop founded in Lama di Reno, Marzabotto in 2017 which makes leather and fabric items. Believing strongly that work is an extraordinary tool for social inclusion, Cartiera offers paths for employment and integration of disadvantaged people, mainly refugees and asylum seekers.

The French **Clear Fashion**⁸⁹, independent expert of garment evaluation, is a solution that informs consumer' on brands' practices 'nd clothes' impact, and enables fashion brands to communicate their scores, to bring more transparency in the fashion industry.

Reverse Resources⁹⁰ (Estonia) is digital platform that digitizes data on textile waste and connects manufactures and fashion brands. They are developing a number of projects to scale up digital solutions to build the infrastructure for textile recycling. It is an important tool, offering stakeholders of a circular system full transparency of waste flows.

Veras⁹¹, based in the Danish capital Copenhagen, operates several initiatives to reduce waste in the garment sector by making it easy for everyone to swap and sell clothes. Veras is primarily an online webshop shipping to all Europe, where users can send in their own clothes. It also hosts weekly clothing markets for everyone to buy and sell clothing and has a flagship store in Copenhagen.

Lena⁹² is the first fashion library of the Netherlands, where you can borrow clothing with a subscription, or buy through the try-before-you-buy principle. An endless wardrobe with the benefits of a fast changing wardrobe, placed in a sustainable context.

The Spanish **PUCO2 project**⁹³, led by AIDIMME, AIMPLAS and INESCOP, uses research and development to combat global warming caused by greenhouse gas emissions. Seventeen companies have taken part in the project, which will also be relevant to producers of adhesives for related sectors, as well as the textile, automotive and toy industries.

⁸⁴ CelluTex. Homepage. Available at: <https://www.ri.se/sv?refdom=www.swerea.se>

⁸⁵ Quid. Homepage. Available at: <https://www.quidorg.it/>

⁸⁶ Vanhulley. Homepage. Available at: <https://www.vanhulley.com/>

⁸⁷ Mistra. Homepage. Available at: <http://www.mistra.org/en/>

⁸⁸ Carteria. Homepage. Available at: <https://www.coopcartiera.it/>

⁸⁹ Clear Fashion. Homepage. Available at: <https://www.clear-fashion.com/>

⁹⁰ Reverse Resources. Homepage. Available at: <https://reverseresources.net/about>

⁹¹ Veras. Homepage. Available at: <https://verasvintage.dk/>

⁹² Lena. Homepage. Available at: <https://lena-library.com/contact/>

⁹³ European Circular Economy Stakeholder Platform. Industrial CO2 emissions transformed into paints, varnishes and adhesives for footwear and furniture. Available at: <https://circulareconomy.europa.eu/platform/en/good-practices/industrial-co2-emissions-transformed-paints-varnishes-and-adhesives-footwear-and-furniture>

LENZING™ ECOVERO™⁹⁴ is an organization from Austria that produces a sustainable and biodegradable fibre brand for apparel. It is developed from renewable pulp and wood sources. The wood which serves as raw material come from certified sustainable sources.

Bio2Materials⁹⁵ is a company which makes a 100per cent biodegradable 'leather' from apples – the main type of fruit grown in Poland.

013Circles⁹⁶ is an initiative by the Dutch municipality of Tilburg for the promotion of circular textiles.

FOREWEAR⁹⁷ is a project based in the Czech Republic. It collects unwanted clothing from company employees and donates them to charity organisations. Part of the material is recycled and, together with surpluses from textile industrial productions, is then used to produce recycled products printed with companies' branding.

Reet Aus⁹⁸ is an organization from Estonia, that aims to minimise the ecological footprint of garment and footwear industry industry by industrial upcycling. This not-wasteful way of production is based on a scientific methodology called UPMADÉ® that has been developed by the designer and founder PhD Reet Aus in cooperation with Stockholm Environment Institute Tallinn Center.

Atelier Riforma⁹⁹ started as an Italian social economy startup with a pioneer marketplace for upcycled garments. Realising that the sorting and cataloguing of textile waste were too labour-intensive for industry standards, founders came up with the idea of developing an AI-based automated solution - called Re4circular - to create a digitized and truly efficient post-consumer clothing supply chain.

Marypup¹⁰⁰ recovers thousands of tents which have been thrown away and uses the fabric to make rainwear: the waste is recovered, transformed and given a new life.

ReBlend¹⁰¹ is an organization from the Netherlands that develops textiles and textile products made from textiles that otherwise would end up in incineration. In collaboration with waste collectors, producers and designers, ReBlend organises a full supply chain from start to finish to accelerate a new ecosystem for circular textiles. ReBlend fabrics, made in partnership with Recover, Raymakers, Enschede Textielstad and Italdenim, was launched in 2019. ReBlend is also collaborating with the Tropen museum in Amsterdam, the Afrika museum in Berg en Dal and the Volkenkunde museum in Leiden (NL) to produce colourful shawls made of 70per cent textile waste and 30per cent recycled PET, inspired by the museums' collections and mixed with cultural and artistic influences.

The **CiLAB collective¹⁰²**, together with the students for furniture design of VOMO started a journey creating new circular concepts based on textile and furniture waste. The concepts do not only facilitate awareness but also link with the local community and the city of Mechelen.

Giovanardi¹⁰³ is an Italian organization that recycles technical acrylic textiles from solar protection industry, to create the Raytent line of high-quality yarns and fabrics.

DyeCoo^[42] (Netherlands) developed a technology that uses zero water to dye textiles, a process that is otherwise often associated with the generation of toxic wastewater. Instead of water, DyeCoo's innovation makes use of carbon dioxide as a solvent in a closed-loop system. While the capital investment in the equipment is higher than for conventional dyeing, the company reports it can reduce operating costs due to the short batch cycles,

⁹⁴ LENZING™ ECOVERO™ . Homepage. Available at: <https://www.ecovero.com/takelessgivemore>

⁹⁵ Bio2Materials. Homepage. Available at: <https://bio2materials.com/en/home/>

⁹⁶ 013Circles. Homepage. Available at: <https://tilburgcirculair.nl/013circles/>

⁹⁷ FOREWEAR. Homepage. Available at: <https://circulareconomy.europa.eu/platform/en/good-practices/forewear-inclusive-social-enterprise-reusing-and-recycling-clothing>

⁹⁸ Reet Aus. Homepage. Available at: <https://www.reetaus.com/>

⁹⁹ Atelier Riforma. Homepage. Available at: <https://atelier-riforma.it/en/about/>

¹⁰⁰ Marypup. Homepage. Available at: <https://en.marypup.eu/>

¹⁰¹ Reblend. Homepage. Available at: <https://www.reblend.nl/>

¹⁰² CiLAB Collective. Homepage. Available at: <https://sites.google.com/view/cilab-collective>

¹⁰³ Giovanardi. Homepage. Available at: <https://www.giovanardi.com/>

the efficient dye use, and the avoidance of wastewater treatments. The technology can also reduce health and safety risks by minimizing worker exposure to toxic chemicals. One of DyeCoo's machines can process 800 tons of polyester per year, effectively saving 32 million liters of water, avoiding the use of 160 tons of chemicals, and eliminating the release of wastewater into the natural environment.

Wool-Line d.o.o.¹⁰⁴ (Bosnia and Herzegovina) is a company that produces wool products without generating waste. Five years ago, they started innovative production of insulating wool construction panels. It is a high quality product made of natural raw materials that replaces insulation panels made of EPS6 and mineral wool and is one of the key elements in the process of transition of the construction sector to the principles of circular economy and construction of "green" facilities.

Maja Halilović¹⁰⁵ is a BiH biodesigner working on her own project for the development of innovative biomaterial based on the cultivation of bacteria SCOBY (symbiotic culture of bacteria and yeast). The obtained material can be of different quality and characteristics, and it is possible to modify, cut, sew, put in molds, etc.

Biofilm can be used instead of plastic in the production of bags for shops, art objects and packaging. M2 - sharing platforms Kudces.ba is a car sharing platform (shared) launched in 2016 with the aim of connecting drivers who have free seats in their car and other passengers traveling in the same direction. It is inspired by the good experience of global applications such as BlaBlaCar.

Orange Fiber^[43] uses 50per cent cellulose fibre from orange peels collected from organic waste that would otherwise be sent to landfill. The patented fabric is being used by Italian brand Salvatore Ferragamo.

By Rotation¹⁰⁶ is a UK peer-to-peer fashion rental platform¹⁰⁶ which encourages users to rent what they need and lend what they don't use frequently at a fraction of the retail price.

Looptworks¹⁰⁷ is a USA company that rescues high-quality leftover and used products and materials from premium goods manufacturers and, through design, transforms them into timeless, functional pieces with a Loopt4Life guarantee.

Initially launched to provide on-demand aftercare directly to consumers, **The Restory**¹⁰⁸, from UK, has evolved into the first aftercare platform. The proprietary tech and unique operating model enables the onboarding and management of curated trade partners. The Restory also created an internal atelier of artisans to develop and provide the advanced services not readily available in the market. Customers can access The Restory's services online or in-store through their retail and brand partners.

Vinted¹⁰⁹ is a peer-to-peer marketplace and community for second-hand fashion developed in Lithuania. Vinted is an app-based platform that uses a peer-to-peer model in which sellers upload their own photos and descriptions of items and ship directly to buyers. This increases the number of owners per item by allowing people to sell and swap items they no longer wear, extending their lifetime.

Vestiaire Collective¹¹⁰ is a French platform established in 2009 to enable individuals to buy and sell second-hand fashion items so that a global community of fashion-loving, environmentally conscious users could put the items they no longer wear or use back into circulation.

The **Renewal Workshop**¹¹¹ is an USA company that takes all of a brand's unsellable apparel and home goods and gives them a longer life through renewed products, upcycled materials or recycling feedstock. These items could come from customer returns, warranty claims, manufacturing defects, products from trade in programs,

¹⁰⁴ Wool Line. Homepage. Available at: <https://wool-line.com/en/>

¹⁰⁵ Maja Halilović. Homepage. Available at: <https://majahalilovic.com/>

¹⁰⁶ By Rotation. Homepage. Available at: <https://byrotation.com/>

¹⁰⁷ Looptworks. Homepage. Available at: <https://www.looptworks.com/>

¹⁰⁸ The Restory. Homepage. Available at: <https://www.the-restory.com/>

¹⁰⁹ Vinted. Homepage. Available at: <https://www.vinted.co.uk/>

¹¹⁰ Vestiaire Collective. Homepage. Available at: <https://fr.vestiairecollective.com/>

¹¹¹ The Renewal Workshop. Homepage. Available at: <https://renewalworkshop.com/>

products damaged in shipping or at retail stores, amounting from hundreds to thousands to millions of items every year depending on the size of the brand.

The clothes that come into the system are cleaned using advanced waterless cleaning technology. Then, half of the garments are professionally repaired and then certified as new. Data is collected on everything that flows through the system and is given back to brand partners, which helps them improve the production and design of future products.

Clothes Doctor¹¹², from UK, provides easy and accessible repair options for clothing and educates its customers around how to look after clothes and why it is important to do so. Clothes Doctor offers a range of products and services to help its customers to clean, store and repair their own clothes at home, as well as offering professional alteration and repair services.

DRESSX¹¹³ is an international digital USA fashion multi-brand retailer that carries digital fashion collections from contemporary brands and designers. DRESSX prevents the production of items that might only be worn once or twice, thus successfully decoupling financial growth from the extraction of raw materials.

Zoa rental¹¹⁴ is the UK's first "Rental as a service" solution. It gives fashion brands the opportunity to add rental of their clothing as an option alongside buying. Brands provide the stock, but Zoa takes care of all of the rental technology, cleaning, logistics and customer service.

Lizee¹¹⁵ is a french software as a service (SaaS) company that allows brands and retailers to launch rental and resale business models in just a couple of weeks. Lizee has created a data-driven Rental Management System (RMS) to manage the whole rental cycle using just one platform – from in-store and online rental handling all the way to shipping, returns, refurbishing and eventually reselling. The system's flexibility allows clients to choose the circular business model that suits their product and customer base – such as subscription, one-off, or on-demand rental.

4.3. Implementing value chain traceability technology tools for circularity

Technologies can be an enabler for improving traceability and transparency for circularity.

Technologies can in fact play a vital role in reducing the cost and accuracy of information associated with product traceability. Digital technologies could also play a key role in decoupling economic growth from resource use and environmental impact that can help in moving forward a more resilient and low-carbon economic recovery.

The EU underlines in key documents the role of digital tools to achieve circular objectives. The European Green Deal, the EU's long-term strategy for a climate-neutral, resource-efficient, and competitive economy to achieve EU climate neutrality by 2050, makes a clear link between the circular and industrial transition.

The 2020 Circular Economy Action Plan also highlights that accelerating the green transition requires digitalisation. It highlights that digital technologies can track the journeys of products, components and materials and make the resulting data securely accessible.

Digital technologies could help in addressing the issues on the interface between products, chemicals, and waste legislation. Moreover, they can lead to more transparency in the value chains. They can also empower consumers in a circular economy because they help integrate information across multiple lifecycles and various stakeholders in a value chain. Through the collection and analysis of data on materials, products and processes, digital technologies have the potential to identify the challenges of material flows, outline the key areas of structural waste, and inform more effective decision-making on how to address these challenges and provide systemic solutions. Digital technologies will also be critical for security of data and systems to be ensured. However, there are specific challenges that must be addressed, such as:

¹¹² Clothes Doctor. Homepage. Available at: <https://clothes-doctor.com/>

¹¹³ Dressx. Homepage. Available at: <https://dressx.com/>

¹¹⁴ Hirestreet. Homepage. Available at: <https://www.hirestreetuk.com/>

¹¹⁵ Lizee. Homepage. Available at: <https://www.lizee.co/>

1. Lack of regulations and standards
2. Data uniformity and standardization
3. Cost of implementing, particularly for SMEs and micro enterprises
4. Data collection
5. Lack of incentives particularly in Europe,
6. Data privacy and security
7. Lack of professional skills
8. Low awareness of benefits
9. Lack of a shared digital backbone
10. Environmental and social impacts.

“The use of digital sources of structured data – based on international standards of identification and machine-readable labelling of goods, focused on ensuring traceability and transparency of the life cycle of goods – contributes to strengthening sustainability and building a circular economy.” Belarus

It is essential to acknowledge the existing challenges and address them adequately to facilitate the transition from the today traditional and linear value chains towards the connected and digital world which is forecasted. A variety of tools are available for organizations including tracking technologies, digital product passports, blockchain technology, advanced manufacturing, and Internet of things. These tools can offer detailed reports on any product’s status and movements and creating direct links between the various stakeholders along the value chain, from producers to consumers.

The table below identifies and provides definitions of the main technologies to support traceability for a circular economy in the targeted sectors.

Table 11: Selection of technologies supporting sustainability and circularity.

| Technology | Definition |
|--|--|
| Alphanumerical codes | A sequence of numbers and letters of various sizes present on labels, and the labels will be put on products or on products’ packages. |
| Bar Code | an optical machine-readable representation of data, which manifests data of the object property to which it attaches. |
| RFID | A technology that uses radio waves to automatically identify objects. |
| Geographic information system (GIS) | a computer-based tool for spatial information management. GIS can organize, analyse, manipulate and manage spatial information in an intuitive way and provide the user with visual information accurately. |
| Global Positioning System (GPS) | A satellite-based radio-positioning system based on a constellation of twenty four satellites continuously orbiting the earth. These satellites are equipped with atomic clocks and send out radio signals of the exact time and their location. These radio signals are picked up by the GPS receiver then it can triangulate its precise location on the ground (i.e., longitude and latitude) from the known positions of the satellites. With four or more satellites, a GPS receiver can determine a 3D position. |
| Digital product passports | Set of data summarizing a product’s components, material, chemical substances and/or information on reparability, replacement parts and proper disposal. |
| Blockchain | Digital, distributed ledger of transactions or records, in which the ledger stores the information or data and exists across multiple participants in a peer-to-peer network. |
| Internet of things (IoT) | Network of smart, interconnected devices and services that are capable of sensing or even listening to requests. |

| | |
|--|--|
| Artificial intelligence | Machines performing human-like cognitive functions (e.g. learning, understanding, reasoning or interacting). |
| Advanced manufacturing technology | Use of innovative technology to improve products or processes that drive innovation. |

The digital product passport

The creation of digital passports for produced items and their components may favour traceability and transparency.

The digital product passport could represent a powerful tool to promote sustainable production, help consumers in making sustainable choices, enable the transition to the circular economy, support authorities to verify compliance with legal obligations and increase trust along value chains' stakeholders. It would allow the sharing among value chain actors of complete, trustworthy, easily accessible, up-to-date, and comparable information that is an urgency in the targeted sectors. From an environmental and social perspective, the digital product passport would provide transparency on the environmental and social performance of products. The information could be used to fight greenwashing and penalise those organizations who are not producing in a sustainable way.

The blockchain technology

The use of blockchain can represent a powerful instrument to boost the exchange of sustainability and circularity related information between all stakeholders. In January 2021 the EU presented a blockchain strategy underlining that this technology could be particularly relevant in the context of a fair, green, and sustainable post-COVID recovery.

Blockchain technology can support organizations in carrying out human rights and environmental due diligence. A blockchain application, in fact, not only allows to collect and share data about where products come from and which journey, they make until they end up on the shelves but can also enable to address human rights and environmental risks along the value chain. Blockchains traceability systems can in fact include data about, for instance, the number of resources used, the concentration of greenhouse gas emissions, the working conditions etc. In this way, organizations on one hand gain more insights into the human rights and environmental risks in their value chains and on the other can show consumers how they prevent or mitigate these risks, by storing information in the blockchain about the measures they have taken that ensure their commitment to respect human rights and protect the environment through a systemic approach. Therefore, the collection of a large amount of product and user data enabled using a blockchain traceability system can be useful for all stakeholders of minerals, food and garments value chains.

There are many issues to be solved while implementing blockchain in a supply chain environment. Global value chains are particularly complex because they need to follow various laws and regulations. Blockchain is a new technology, so experts, tools and knowledge are lacking. Adopting blockchain is resource demanding considering that it requires to invest time, effort, and new IT tools. Other challenges relate to performance, scalability, interoperability, data integrity, security, and privacy. Another discussed challenge is about blockchain's potential negative implications for energy consumption. Many blockchains use a validation mechanism known as 'proof-of-work' that demands vast computing power and results in substantial electricity consumption. However, high energy consumption is not intrinsic to blockchain technology in general: the amount of energy consumed by a blockchain network depends on its consensus mechanism, determining what information is added to the network ledger. These and other challenges will need to be carefully considered and assessed while developing a blockchain traceability solution.

Blockchain solutions

UNECE Blockchain Pilot for Traceability and Due Diligence in Cotton and Leather Value chains

In 2020, UNECE launched a pilot project to develop a blockchain system for traceability and due diligence in the cotton and leather value chain, from field to shelf. The pilot aims to provide governments and companies with a set of tools to advance traceability, transparency, and sustainability in this industry and to support the identification and coding of the key data to assess the sustainability performance of products, processes, and facilities.

The pilot tests a selected set of sustainability claims, identified jointly with partners, which concern origin, content use of chemicals, and compliance with due diligence requirements. Partners have also been asked:

- To identify those products and materials (traceable assets) to which one or more of the selected sustainability claims should be applied.
- To collect and exchange relevant information and documents with business partners (e.g. shipping documents, delivery notes, invoices) and sustainability certificates and inspection reports that are collected at relevant nodes of the value chain.
- Traceability is ensured by the application of DNA markers. A public, permissionless, Ethereum blockchain, which allows for the running of smart contracts, is used to increase the trustworthiness of the data as well as the connectivity, cost-efficiency, scalability, and transferability of the solution. Later, the transfer of data from existing systems will be allowed through an application programming interface (API).

The following considerations and recommendations are emerging from the ongoing implementation of the pilot:

- Need for an enabling environment for engagement and collaboration of all upstream and downstream value chain actors.
- Tailored policy and regulations which reference standards for data interoperability and take into account other evolving technologies (i.e. AI, IoT, big data and cloud computing); Open source, inclusive solutions and capacity-building for scaling up, particularly with small business; Support of frameworks for data security, privacy and governance as preconditions for accelerating adoption.
- Data models for inspection reports, certificates and credentials based on international standards for information exchange (e.g. UN/CEFACT e-business standards).

Blockchain and machine learning/artificial intelligence model for resource management is included in the UNRMS toolkit. It will be based on its distributed ledger technology's nature to provide a "designed in" solution, simultaneously enabling full end-to-end/continuous traceability and transparency of molecules and monies. A significant advantage of blockchain lies in the use of automated "smart contracts". Blockchain will deliver circularity as well as support inhibiting or eliminating illicit flows of both resources and funds.

Example: Blockchain voor agrifood project

The blockchain voor agrifood is a Dutch pilot project developed in 2017 collaboration with the Wageningen University and Research and funded by the Dutch Ministry of Economic Affairs aiming at achieving a better understanding of blockchain technology and its implications for the agrifood sector, especially of how it can impact specific aspects of the food chains.

The project developed a pilot use case on table grapes imported to the Netherlands from South Africa where blockchain technology could be applied to track the validity of certificates for food quality.

The table below provides several examples from the targeted sectors where blockchain has been used in pilot-scale to bring transparency in the value chain and enable trust.

Table 12: Blockchain projects on traceability and transparency of mineral supply chains.

| Name Initiative | Description |
|--|---|
| Ford Motor Company, Huayou Cobalt, IBM, LG Chem, and RCS Global | Blockchain platform pilot to trace and validate ethically sourced cobalt |
| De Beers | Diamond tracking blockchain traceability platform Tracr |
| SustainBlock | ASM-to-end-user blockchain-based project |
| A consortium involving BNP, HSBC, Cargill, Rio Tinto | Fully integrated trade finance blockchain, expanding on Singapore iron ore end-to-end LOC transaction. |
| MineHub Technologies | Mining and metals trading blockchain platform in collaboration with IBM, ING Group, Wheaton Precious Metals, Ocean Partners USA, Kutcho Copper, Capstone Mining and White & Case LLP. |

Source, UNECE desk research

Table 13: Blockchain projects on traceability and transparency of food value chains.

| Name Initiative | Description |
|--------------------------------|---|
| Food Trust | Platform developed by The Sustainable Shrimp Partnership in collaboration with IBM that provide complete traceability of shrimps for consumers. It also helps to verify the authenticity of product claims. data related to the shrimp production will be uploaded onto the blockchain which can be accessed by the retailers and consumers at every stage of the process. This platform will also ensure verification of the shrimp's SSP qualification, e.g. it is adhering to the Aquaculture Stewardship Council (ASC) Standard and is antibiotic-free. |
| OpenSc platform | Blockchain platform, developed by Nestle with OpenSC to trace milk from farms and producers in New Zealand to Nestlé factories and warehouses in the Middle East. It is founded by WWF-Australia and The Boston Consulting Group Digital Ventures. |
| IBM Food Trust platform | Platform that ensures traceability and transparency in the Cermaq salmon and Laberie value chain providing information, among others about the fish; its origin, its hatching time and date, breeding conditions, its length, time of its transfer to seawater, the kind of vaccination it was given. By scanning the QR code on the package, consumers can access to this information. |

Source, UNECE desk research.

Box 5: Applying traceability technologies in the agrifood sector in UNECE programme countries

The blockchain technology for better food waste management in Serbia

In 2021 UNDP, in partnership with Delhaize Serbia and with the participation of the NGO Food Bank Belgrade, developed the first digital platform for food donation in Serbia „Plate by Plate”¹¹⁶ so that humanitarian organizations can take discarded fruits and vegetables from stores. Through the platform, the shops make daily updates in the information on available quantities of fruits and vegetables and a beneficiary organisation can collect food supplies from more than one shop. The platform also enables registration of new interested humanitarian organisations and associations which will, through the Food Bank, be given their accounts and an opportunity to collect on daily basis the available food.

“Plate by Plate” is based on the blockchain technology, which contributes to security, traceability, and better connectedness of the entire process. The platform allows traceability and monitoring of the complete history of activities, and once a transaction is made, no modifications are allowed.

Donating food surpluses will contribute to achieving the SDG 2 “World without Hunger”, and Goal 12 “Responsible consumption and production”, and reduce harmful emissions of greenhouse gasses produced by organic waste, thus contributing to fighting climate change SDG 13 “Climate action”.

System for the identification, labelling and traceability of goods in Belarus

The system for the identification, labelling and traceability of goods in Belarus is based on the concept of "digital product passport", which includes a description in the form of a set of standardized fields and an international unique identifier. Electronic passports are accumulated in the Bank of Electronic Passports of Goods¹¹⁷ (ePASS).

¹¹⁶ UNDP, New digital platform for food donation „Plate by Plate” launched, 24 February 2021. Available at: <https://www.undp.org/serbia/news/new-digital-platform-food-donation-per-centE2per-cent80per-cent9Eplate-per-centE2per-cent80per-cent9C-launched>

¹¹⁷ The system «Pool of electronic passports of trade items» of the Republic of Belarus. Available at: <http://epass.by/?rvn=1>

ePass is a centralized information resource containing descriptions of goods in a format conforming to international standards of electronic commerce. Product descriptions come to ePass from primary sources – manufacturers and importers. In the future, product descriptions are transmitted to supply chain participants for use in business process automation systems.

The electronic product passport combines a set of attributes that already contain the data required to implement certain stages of the circular economy concept and can be expanded with those data that will be required in the future for smart technologies for managing the flow of secondary resources. It is also beneficial for:

- better resource management,
- reduction of costs of multiple manual entry of product data into information systems,
- uniformity of product information throughout the supply chain,
- automatic monitoring and provision of consumers with information about documents confirming the quality and safety of goods.

ePass is endowed with the status of a republican information system for maintaining basic information about goods for the purposes of automated accounting in commodity distribution networks and conducting electronic commerce processes. As of February 2022, about 30,000 supply chain participants are ePASS users. ePASS is replenished daily, on average, with 14,000 unique electronic passports of goods, their total number already exceeds 9.6 million.

5. Recommendations on traceability of value chains for a better transition to the circular economy

5.1. UNECE policy tools and relevant publications

UNECE has a long history of producing outstanding deliverables in the field of traceability and transparency to enable sustainability and circularity of value chains.

Enhancing traceability and transparency for sustainability and circularity in the garment and footwear sector

UNECE supports all stakeholders in the uptake of traceability and transparency approaches through the EU-funded initiative “Sustainability Pledge” in the garment and footwear sector. This sector has been identified as a key sector in bringing about a carbon-neutral circular economy by the European Green Deal, the New Circular Economy Action Plan, as well as the New Industrial Strategy for Europe. Efforts to promote more sustainable textiles are also reflected in the EU Strategy for Sustainable and Circular Textiles recently released. In addition, the European Environment Agency is also working intensively on instituting a circular economy in the textile industry.

With support of EC the department for International Partnerships (DG INTPA), UNECE and the United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT), has developed and adopted a **Policy Recommendation** to Governments on Traceability and Transparency in Garment and Leather Value Chains, **Guidelines** for Decision makers and a **Call to Action** with a reporting mechanism to facilitate the exchange of good practices and lessons learned.

In addition, UNECE has developed a **Business and Data Model** for the exchange of traceability and sustainability information. The information is product/process/facility/transport related information for the entire value chain from raw material production and processing. It covers aspects such as origin, composition, quality, process inputs and outputs, economic operators’ details, facility value chain activity, location, IDs. Regarding sustainability information, it is related to: (1) environmental criteria (hazardous chemicals, pesticides, water, CO2 emissions, energy, land, waste, end-of-life, soil degradation, deforestation, biodiversity, etc.); (2) human rights and labour criteria (working conditions including wage, forced and compulsory labour, trade unions and collective bargaining rights, discrimination, exploitation of home workers, working conditions including wages, working times, contracts, temporary employment, recruitment practices, social security); (3) health and safety on the workplace, including protection equipment; (4) ethical aspects, including bribery and corruption and land rights; (5) animal welfare. This is organized in a traceability/sustainability information matrix, included in the policy recommendation, standard and implementation guidelines developed under the project. Such matrix draws upon the criteria listed in the OECD DD Guidelines, the ITC sustainability map, and the

UNEP sustainability risks analysis, and about 220 standards. These criteria have been selected to support the widest relevant number of United Nations Sustainability Development Goals (SDGs) and correspond to the ITC sustainability standard and its criteria. The standard also maps the key business processes, actors and sustainability information to be traced at key data points along the value chain so that all actors speak the same language about product claims.

As mentioned above, UNECE is also implementing **Blockchain Pilots** to prove full traceability of finished textile and leather products from field to shelf.

The Policy Recommendation n.46, developed within the UNECE project “Enhancing traceability and transparency for sustainability and circularity in the garment and footwear sector”, identifies a set of measures to advance traceability and transparency for circularity in garment and footwears, and in particular:

Policy actions, norms and standards. It refers to the need of developing regulations on traceability and transparency and adopting international standards for data collection and exchange.

Incentives. It refers to the need to provide an effective and efficient system of both public and private incentives, as well as accountability mechanisms. Incentives, to maximise the effectiveness of mandatory traceability and transparency requirements, with supporting measures that are necessary to address potential barriers to implementation such as capacity and resource constraints, particularly for SMEs and in developing countries, as well as potential unintended consequences such as de-risking or de facto embargos.

Research & Development. It refers to the need to promote research and development and support to innovation to increase the lifespan of products, create more sustainable materials and products sustainable by design, recycling, reusing and redesigning garments, and harness the potential of advanced technologies to connect industry actors and support the information and documents exchange needed for the reliability of claims.

Awareness & education. It refers to the need to raise awareness and education of businesses and consumers and building capacity, especially for SMEs, including in producing countries.

Multi-stakeholder collaborative initiatives. It addresses the need to provide support to partnerships and initiatives that bring together all industry actors and ensure the exchange of good practices and lessons learned.

As of June 2022, 76 pledges on specific actions to advance traceability and transparency in garment and footwear value chains, from 67 actors, of which 41 micro-, small, and medium-sized enterprises, including 287 partners, have been submitted and published on The Sustainability Pledge website. The initiative has an international coverage with a total of 22 countries involved so far. Among 17 UNECE programme countries only Uzbekistan is a part of the Sustainability Pledge. UNECE invites other countries to join and stands ready to offer its support for advancing the sustainable and digital transition through enhanced traceability and transparency of value chains.

By utilising a widely accepted traceability framework, such as the one developed by UNECE, organizations can send a clear message to customers, investors and other stakeholders that they take ESG risks seriously and incorporating them into their strategic planning.

Enhancing traceability and transparency for sustainability and circularity in the mineral sector

Circularity and transparency are two fundamental principles of the **United Nations Resource Management System**¹¹⁸ (UNRMS) – a voluntary global standard for integrated resource management within the framework of public, public-private, and civil society partnerships that is uniformly applicable to all natural resources such as minerals, petroleum, renewable energy sources, nuclear resources, anthropogenic resources, geological storage and groundwater. UNECE continues working on the development of UNRMS as a comprehensive tool kit to ensure natural resources are managed in a sustainable and integrated manner.

¹¹⁸ UNECE, Draft United Nations Resource Management System: Principles and Requirements, 14 April 2022. Available at: <https://unece.org/sed/documents/2022/04/session-documents/draft-unrms-principles-and-requirements>

UNRMS **Resource as a Service tool** will provide stakeholders with options, checklists, and guidelines on what is required for the transition from linear to circular economy. Stakeholders could implement the transition in a phased manner. The tool will include aspects of comprehensive resource recovery, value-addition, and circularity.

UNRMS identifies a circular economy as a systems approach to industrial processes and economic activity that enables the resource to maintain its highest value for as long as possible. A set of circular requirements to the resource management (should be adapted in a case-by-case manner depending on a concrete resource sector) include:

- a) Waste hierarchy model: The “waste hierarchy” ranks waste management options according to what is best for the environment. It gives top priority to preventing waste in the first place.
- b) Design for circularity: Design out waste and pollution; keep products and materials in use, and regenerate natural systems.
- c) Anthropogenic resource management: Use of residues as secondary resources.

UNECE is working on the increasing adoption of and interest in the application of UNRMS in various countries, sub-regions, and regions, including: the EU, Commonwealth of Independent States region, African Union, Asia-Pacific, North America, and Latin America.

UNRMS is as a companion to the **United Nations Framework Classification for Resources**¹¹⁹ (UNFC) - is a global classification and management system applicable to mineral, petroleum, nuclear fuel, renewable energy, and anthropogenic resources, as well as water and injection projects for geological storage.

Enhancing traceability and transparency for sustainability and circularity in the agrifood sector

UNECE has addressed the food loss challenge in view of enhancing the circular economy in the region. Through the constant review of the quality standards for agricultural produce traded internationally and nationally, UNECE ensures that the quality of the products used and traded is maintained along the entire supply chain. Food loss is therefore prevented and reduced. UNECE also focuses on the food lost in the trade process before it reaches the consumer and even retail.

UNECE has developed a **food loss and waste measuring methodology for fresh produce supply chains**¹²⁰. While a stand-alone tool, the simple UNECE methodology, which records losses and waste from production to wholesale levels, can also be integrated into an IT-based smart food loss management system to help trace and make food visible which would otherwise be lost or wasted and create opportunities to re-distribute food through or to alternative food chains.

Table 14: UNECE publications on traceability for circular economy and sustainable use of natural resources.

| Name of the document | Type of the document | What you can find here |
|---|--|---|
| Cross-sectoral | | |
| Natural Resource Nexuses in the UNECE region 2021 Link | The study prepared by the UNECE secretariat with a leading role of a Sustainable Use of Natural Resources Nexus team. | <ul style="list-style-type: none"> ✓ Complex interactions and feedback loops between human and natural systems affecting the natural resource base such as energy, food, land, materials, and water. ✓ Highlights on systematically measured data in sustainable resource management. |
| Measuring and monitoring the circular economy and use of data for policymaking November 2021 | The background paper for the Second Regional Conference on measuring and monitoring the circular economy and the use of data for policymaking. | ✓ A snapshot of circular economy, and how it could be measured in the target countries with the proposal of a circular economy scoreboard including quantitative indicators. |

¹¹⁹ United Nations Framework Classification for Resources Update 2019 (ECE ENERGY SERIES No. 61). Available at: <https://unece.org/info/Sustainable-Energy/UNFC-and-Sustainable-Resource-Management/pub/2772>

¹²⁰ UNECE, Simply Measuring - Quantifying Food Loss and Waste: UNECE food loss and waste measuring methodology for fresh produce supply chains, April 2022. Available at: <https://unece.org/info/publications/pub/366261>

| | | |
|---|---|--|
| Link | | |
| <p>Circular economy and the sustainable use of natural resources: Trends and opportunities in the region of the Economic Commission for Europe</p> <p>4 February 2021</p> <p>Link</p> | <p>UNECE policy brief for the Sixty-ninth session of the Commission in April 2022.</p> | <ul style="list-style-type: none"> ✓ Major trends in resource use in the UNECE region, the relevance of normative instruments, policy advice and capacity-building activities for the promotion of a circular economy and the sustainable use of natural resources. ✓ Highlights on traceability, transparency, and reliable data in this context. |
| Agrifood | | |
| <p>Circularity concepts in forest-based industries</p> <p>May 2022</p> <p>Link</p> | <p>Study prepared jointly by UNECE and Food and Agricultural Organization of the United Nations.</p> | <ul style="list-style-type: none"> ✓ Existing and possible limitations to circular approaches in forest-based industries, and evidence that not all circular approaches are sustainable under all circumstances. ✓ The role of traceability in the sustainable use of cellulose-based fibres. |
| <p>UNECE Code of Good Practice for Reducing Food Loss in Handling Fruit and Vegetables</p> <p>July 2020</p> <p>Link</p> | <p>The Code was endorsed by the UNECE Working Party on Agricultural Quality Standards (WP.7) in November 2019. It is intended to help maintain quality along supply chains, reduce food waste and associated costs.</p> | <ul style="list-style-type: none"> ✓ Measures that can be taken by producers, traders, and retailers to prevent and reduce food loss and waste at the various stages of the supply chain before the fruit and vegetables reach the consumer. |
| Minerals | | |
| <p>Policy Brief: Transforming Extractive Industries for Sustainable Development</p> <p>May 2021</p> <p>Link</p> | <p>The document is published after a six-month global consultation process conducted by the five UN regional economic commissions and led by the UN Secretary General and his team.</p> | <ul style="list-style-type: none"> ✓ Concrete recommendations for transforming the extractives sector into an engine for sustainable development, which can support a just transition to a net zero, circular, and inclusive global economy. |
| <p>Concept Note: United Nations Framework Classification for Resources and United Nations Resource Management System - Systems approach to enabling the resource as a service paradigm through blockchain technologies</p> <p>April 2022</p> <p>Link</p> | <p>The concept note is prepared by the Sustainable Development Goals Delivery Working Group of the Expert Group on Resource Management for the Thirteenth session of the UNECE Expert Group on Resource Management.</p> | <ul style="list-style-type: none"> ✓ Arguments for progressing towards a sustainable, integrated and more circular economy utilizing systems thinking. ✓ Assessment of blockchain model. |
| <p>Extractive Industries: Transition to Sustainable Systems</p> <p>April 2021</p> <p>Link</p> | <p>Regional policy brief developed based on the outcomes of the five Regional Roundtables on Extractive Industries organized by the United Nations Regional Commissions.</p> | <ul style="list-style-type: none"> ✓ Clear list of 13 recommendations on strengthening sustainable performance of extractive industries, including on strengthening transparency, accountability, and governance through supply chain traceability. |

5.2. Policy options for the targeted sectors

Value chains are becoming more complex and less transparent. Consumers, investors governments and civil society organizations are increasingly concerned about the protection of the environment and the respect of human rights. These concerns are expressed in a growing demand for data and information about sustainability performance of products, process, and organizations. The number of sustainability schemes is increasing, but the level of trust between stakeholders along the chains is decreasing. The credibility of claims is in doubt.

The policy paper shows that without traceability, there can be no sustainability and circularity. To be able to address the social and environmental risks of global value chains it is essential to know precisely what is going on at every stage of the value chain and to have data to fully understand value chains and take the actions required to accelerate the circular transformation creating competitive, resilient, and innovative value chains.

The implementation of a traceability framework in the targeted sector is necessary to ensure trust among all stakeholders along value chains and to create new economic value, minimise social and environmental impacts and mitigate liability from waste.

“There is a need to implement a circular economy approach for all – reducing the creation of waste with local communities in mind and implementing materials management strategies that are inclusive of communities with environmental justice concerns.” USA

Policy makers should put in place measures to achieve harmonized and well-functioning traceability systems in the UNECE region and create the right conditions for action by industry and civil society. Regulatory, monitoring, auditing and law enforcement entities and directives might be particularly important within a transition to a circular economy. In a more sustainable and circular world organizations operating in the minerals, agrifood, and garment and footwear sectors will need to work within a common set of policies and regulations at the local, national, and global levels. Policy may play a significant role in ensuring that organizations adopt a unified approach to traceability by mandating and regulating the industry.

However, policy makers must not simply strengthen traceability of value chains introducing mandatory requirements but also improve industry behaviour by encouraging transparency and boosting consumers engagement. This collaborative and trust-based model advance consensus-oriented stakeholder decisions.

To develop effective policy and regulation on traceability, governments should understand the opportunities and challenges of traceability, transparency, sustainability and circularity in the targeted sectors and agree on appropriate roles, responsibilities and common metrics.

“Only with an appropriate legislative framework can a full circularity of the economy be achieved.” Belarus

The development of flexible and dynamic policy and regulation on traceability that reflects the interests of the wider stakeholder community will be key to move towards the transition to a circular economy.

What follows is a selection of recommendations to be considered by governments in the design, development, and implementation of a policy framework on traceability and transparency in the UNECE region.

Look at the market drivers and the sector. Assess the economic scenario understanding what drives values for consumers and investors and civil society in the country considered, while also analyzing the entire value chain.

Tailor the policy. The specific characteristics of the sector will be different and will have to be considered while establishing the rules.

Engage industry stakeholders. Set up a multistakeholder dialogue to assess the sustainability risks, shared the vision and get commitment from the industry.

Define a roadmap. Establish an action plan to guide organizations in the transition to a circular economy including the development of engagement plans with other governments and civil society and establish checkpoints to assess progress.

Develop national strategies for circular economy process. The strategies could lead to the adoption of circular economy business plans, in the following scopes:

- Eco-design of processes and products,

- Eco-efficiency,
- Energy efficiency,
- Eco-innovation,
- Industrial symbioses,
- Extension of the product life cycle,
- Valorisation of by-products and residues,
- New business models, dematerialization, and digital transformation.

These strategies could contain the following measures:

- A digital waste traceability system that will support on one hand the development of secondary market for raw materials (by giving a clear framework of the supply of secondary raw materials) on the other hand the control authorities in preventing and tackling illegal management of waste,
- Tax incentives to support the recycling activities and the use of secondary raw materials.
- A revision of environmental taxation system on waste to make recycling more convenient than landfilling and incineration across the national territory.
- Right to reuse and repair.
- Introduction/reform of the EPR (extended producer responsibility).

Create an effective and efficient system of incentives. This may include, for example, special financing instruments for business to have preferable rates for loans related to supply chain improvements or other forms of financial support such as tax credits or subsidies. Favourable loans could be offered through public financial institutions. Governments can also work with private banks and insurance companies to encourage them to provide incentives for good responsible business conduct performance.

Identify and analyse international best practices on traceability and circularity. Organizations need to be aware of best practices from around the world and their key success factors and governments should share these practices to guide them in the development of best practices in the country.

Raise consumers awareness and education. The level of information provided to consumers fosters sustainable consumption patterns. It is important that consumers are informed and educated about the sustainability aspects of products, so that they make conscious choices in the purchasing, using and end of life phase and have an active role in the circular economy transition.

Promote research and development (R&D). Organizations should start to develop the technologies to operate in a clean and safe environment and they need support to do so. Tax exemptions and incentives could be introduced in to lessen the short-term costs of investing in environmental technologies and green practices.

Provide information and support to SMEs and MSEs. SMEs and MSEs need tailored support and guidance to implement traceability systems. For example, public investment bank could offer loans at favourable rates and without collateral for SMEs who adopt sustainable technologies or develop new ones.

Develop common traceability standards. The standards serve as a benchmark for organizations and governments to assess performance, resulting in robust policies that cover a wide range of tools to achieve circularity and help introduce mechanisms to reward organizations that achieve these standards.

Provide consumers incentives. Choose sustainable and circular products should not be constrained by exorbitant prices, hence incentives to buy and consume sustainably will have to be provided. Support voluntary sustainable consumption programmes.

Support a national, globally connected, trading platform. For the circular economy to function efficiently and support a vibrant and sustainable bioeconomy in the targeted sectors, a full chain perspective is essential. The movement of produce along the chain should be seamless, with support mechanisms to enable barrier-free movement. A dynamic and commercially functioning marketplace for resources is essential, with traceability underpinning the provenance of the materials. Given the disparities and nuances at local, regional and national levels, platforms should be country-specific, but globally connected (i.e. nodes in a global platform web), thus enabling all levels of trade – local, regional, national, international - to act as a key driver of the (national and international) circular economy. Such platforms should

ultimately be commercially self-sustaining, but their initial development requires public support, preferably a phased withdrawal of public moneys and transition to commercial funding over a fixed initial development phase (e.g. 5 years).

Facilitate the adoption of digital tools and advanced technologies. Governments should make easier for organizations to use digital tools and advanced technologies for the handling and sharing of data among actors along the value chain and promoting them with incentives.

Encourage strong partnerships among organizations, investors, consumers, and other stakeholders. An organization to be successful depends on collaboration among all relevant actors built on trust and based on common objectives.

The UNECE Framework developed within the project “Enhancing Traceability and Transparency for Sustainable and Circular Value Chains in Garment and Footwear” could play an active role in supporting governments, institutions, organizations, and all value chain actors to enable more sustainable, resilient, and proactive industries. By looking at the work conducted under this project it is in fact possible to identify the framework needed for advancing traceability and transparency and adapting it to the specific characteristics and needs of the sector considered.

The many stakeholders involved in the consultation of the policy brief showed that the traceability change required to achieve the circular economy paradigm cannot be reached by regulators alone. A continuous and proactive dialogue between government, industry and civil society will be key.

Transitioning to a circular economy calls, in fact, for intervention at different levels.

Policy makers should define and develop the traceability and transparency tools able to foster and support better decision-making, transparency, control, and accountability in complex industries dealing with great economic, environmental, and social pressures. Organizations have not to only embed circular economy principles into their strategic management, operations, and production, but also promote collaboration among stakeholders and involving local communities.

Bibliography

- 013Circles. Homepage. Available at: <https://tilburgcirculair.nl/013circles/>
- Action Plan for the Implementation of the Sofia Declaration on the Green Agenda for the Western Balkans 2021-2030, 4 October 2021, Sarajevo. Available at: <https://balkangreenenergynews.com/wp-content/uploads/2021/10/GAWB-ACTION-PLAN-Final-04.10.2021.pdf>
- Arla. (2019). Sustainable Dairy Production. Available at: <https://web.archive.org/web/20190729204703/https://www.arla.com/company/responsibility/sustainable-dairy-production/>
- Atelier Riforma. Homepage. Available at: <https://atelier-riforma.it/en/about/>
- BBC, “Why clothes are so hard to recycle”, 13 July 2020. Available at <https://www.bbc.com/future/article/20200710-why-clothes-are-so-hard-to-recycle>
- BeesCoop Supermarket. (2019). Homepage. Available at: <https://web.archive.org/web/20190729202859/https://bees-coop.be/en/>
- Bio2Materials. Homepage. Available at: <https://bio2materials.com/en/home/>
- Bio-Bean. (2019). About Us. Available at: <https://web.archive.org/web/20190729205103/https://www.bio-bean.com/about-us/>
- By Rotation. Homepage. Available at: <https://byrotation.com/>
- Carteria. Homepage. Available at: <https://www.coopcartiera.it/>
- CelluTex. Homepage. Available at: <https://www.ri.se/sv?refdom=www.swerea.se>
- CiLAB Collective. Homepage. Available at: <https://sites.google.com/view/cilab-collective>
- CISION, Loop and Loblaw to Bring Circular Shopping Platform to Canada, 2019. Available at: <https://web.archive.org/web/20190729200239/https://www.newswire.ca/news-releases/loop-and-loblaw-to-bring-circular-shopping-platform-to-canada-868732954.html>
- City of Guelph, 50x50x50 by 2025: Creating Canada’s first circular food economy. Available at: https://web.archive.org/web/20190729201450/https://guelph.ca/wp-content/uploads/SmartCities_Booklet.pdf
- Clear Fashion. Homepage. Available at: <https://www.clear-fashion.com/>
- Clothes Doctor. Homepage. Available at: <https://clothes-doctor.com/>
- Cork-A-Tex. Homepage. Available at: <https://www.cork-a-tex.com/about-cork-a-tex/>
- Decree of the President of the Republic of Belarus dated December 29, 2020, N 496 "On the traceability of goods". Available at: <https://www.alta.ru/tamdoc/20b10496/>
- Dressx. Homepage. Available at: <https://dressx.com/>
- ECHA European Chemicals Agency. Chemicals Strategy for Sustainability. Available at: <https://echa.europa.eu/hot-topics/chemicals-strategy-for-sustainability>
- EURATEX (2022). Facts & key figures 2022 of the European textile and clothing industry, 2022. Available at: <https://euratex.eu/facts-and-key-figures/>
- European Circular Economy Stakeholder Platform. Industrial CO2 emissions transformed into paints, varnishes and adhesives for footwear and furniture. Available at: <https://circulareconomy.europa.eu/platform/en/good-practices/industrial-co2-emissions-transformed-paints-varnishes-and-adhesives-footwear-and-furniture>
- European Commission, A Background Analysis on Transparency and Traceability in the Garment Value Chain, 2017. Available at https://platform.ict-tex.eu/pluginfile.php/1536/mod_resource/content/1/european_commission_study_on_background_analysis_on_transparency_and_traceability_in_the_garment_value_chain.pdf
- European Parliament (2018). Ecodesign directive: from energy efficiency to recycling, 24 May. Available at <https://www.europarl.europa.eu/news/en/headlines/society/20180522STO04021/ecodesign-directive-from-energy-efficiency-to-recycling>

European Parliament, Circular economy: definition, importance and benefits, 26 April 2022. Available at <https://www.europarl.europa.eu/news/en/headlines/economy/20151201STO05603/circular-economy-definition-importance-and-benefits>

European Parliament, Draft report on the New Circular Economy Action Plan (2020/2077(INI)) Committee on the Environment, Public Health and Food Safety, Rapporteur: Jan Huitema. 12 October 2020. Available at https://www.europarl.europa.eu/doceo/document/ENVI-PR-652387_EN.html?redirect

European Parliament, Greenhouse gas emissions by country and sector (infographic), 28 October 2021. Available at <https://www.europarl.europa.eu/news/en/headlines/priorities/climate-change/20180301STO98928/greenhouse-gas-emissions-by-country-and-sector-infographic>

FAO (2022). The State of Agricultural Commodity Markets 2022. The Geography of Food and Agricultural Trade: Policy Approaches for Sustainable Development (Rome, FAO, 2022), available at: <https://doi.org/10.4060/cc0471en>

FAO. Assessment of Agricultural Plastics and Their Sustainability: A Call for Action, 2021. Available at <https://www.fao.org/documents/card/en/c/cb7856en>

Federal Ministry of Labour and Social Affairs. Due Diligence Act: Law on corporate due diligence to prevent human rights violations in supply chains. Available at: <https://www.bmas.de/DE/Service/Gesetze-und-Gesetzesvorhaben/gesetz-unternehmerische-sorgfaltspflichten-lieferketten.html>

Fedlex (2021). Ordonnance sur les devoirs de diligence et de transparence en matière de minerais et de métaux provenant de zones de conflit et en matière de travail des enfants, 3 December. Available at: <https://www.fedlex.admin.ch/eli/cc/2021/847/fr>

FOREWEAR. Homepage. Available at: <https://circulareconomy.europa.eu/platform/en/good-practices/forewear-inclusive-social-enterprise-reusing-and-recycling-clothing>

Fraunhofer. Homepage. Available at: <https://www.fraunhofer.de/en.html>

Giovanardi. Homepage. Available at: <https://www.giovanardi.com/>

GreenWave. (2019). Our Work. Available at: <https://web.archive.org/web/20190729200611/https://www.greenwave.org/our-work>

Hirestreet. Homepage. Available at: <https://www.hirestreetuk.com/>

Il Giardinone Cooperativa Sociale. Homepage. Available at: <https://www.ilgiardinone.it/>

ILO Stat, “Statistics on the informal economy”. Available at https://ilostat.ilo.org/topics/informality/#elementor-toc__heading-anchor-1

ILO, “The state of the apparel and footwear industry: employment, automation and their gender dimensions”, January 2022. Available at: https://www.ilo.org/wcmsp5/groups/public/---ed_emp/documents/publication/wcms_835423.pdf

IRENA, World Energy Transition Outlook 2022: 1.5° Pathway, March 2022. Available at <https://irena.org/publications/2022/mar/world-energy-transitions-outlook-2022#:~:text=Byper cent20layingper cent20outper cent20aper cent20map,useper cent20sectorsper cent3Aper cent20electrificationper cent20andper cent20bioenergy.>

ISO 9001:2015 Quality management systems – Requirements, September 2015. Available at <https://www.iso.org/standard/62085.html>

La Tablée des Chefs . (n.d.). History. Available at: <https://web.archive.org/web/20200618222046/https://www.tableedeschefs.org/en/history/>

Law of the Republic of Albania dated January 28, 2008, No. 9863 “On food”. Available at: <http://aku.gov.al/wp-content/uploads/2016/06/Ligji-Nr-9863-datë-28.-1.-08-i-ndryshuar-me-26.03.20013.pdf>

Lena. Homepage. Available at: <https://lena-library.com/contact/>

LENZING™ ECOVERO™ . Homepage. Available at: <https://www.ecovero.com/takelessgivemore>

Lizee. Homepage. Available at: <https://www.lizee.co/>

LOI n° 2017-399 du 27 mars 2017 relative au devoir de vigilance des sociétés mères et des entreprises donneuses d'ordre. Available at: <https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000034290626/>

Looptworks. Homepage. Available at: <https://www.looptworks.com/>

Lufa Farms. Homepage. Available at: <https://web.archive.org/web/20190729200838/https://montreal.lufa.com/en>

Maja Halilović. Homepage. Available at: <https://majahalilovic.com/>

Marypup. Homepage. Available at: <https://en.marypup.eu/>

McKinsey (2020). Fashion on Climate, How the Fashion Industry Can Urgently Act to Reduce Its Greenhouse Gas Emissions. Available at: <https://www.mckinsey.com/~media/mckinsey/industries/retail/ourpercent20insights/fashionpercent20onpercent20climate/fashion-on-climate-full-report.pdf>

McKinsey, “Climate risk and decarbonization: what every mining CEO needs to know”, 28 January 2020, available at <https://www.mckinsey.com/business-functions/sustainability/our-insights/climate-risk-and-decarbonization-what-every-mining-ceo-needs-to-know>

McKinsey, The raw-materials challenge: How the metals and mining sector will be at the core of enabling the energy transition, 10 January 2022. Available at <https://www.mckinsey.com/industries/metals-and-mining/our-insights/the-raw-materials-challenge-how-the-metals-and-mining-sector-will-be-at-the-core-of-enabling-the-energy-transition>

Ministère de la Transition Énergétique (2020). La loi anti-gaspillage pour une économie circulaire, February. Available at: <https://www.legifrance.gouv.fr/loda/id/JORFTEXT000041553759/>

Mistra. Homepage. Available at: <http://www.mistra.org/en/>

Monteco, “Project43: the traceable circular economy project”, available at <https://manteco.com/project/project-43/>

Monteco. Homepage. Available at <https://manteco.com/circular-economy-practices/>

Nu Grocery. Our Story. Available at: <https://web.archive.org/web/20191218012931/http://nugrocery.com/our-story/>

OECD (2020), OECD Feasibility Study: Measuring the Uptake and Impact of Due Diligence in the Garment and Footwear Sector Supply Chain. Available at <http://mneguidelines.oecd.org/OECD-feasibility-study.pdf>

OECD /FAO, OECD-FAO Agricultural Outlook 2022-2031 (OECD Publishing, Paris,2022) available at: <https://doi.org/10.1787/f1b0b29c-en>

OECD, Due Diligence Guidance for Responsible Supply Chains in the Garment and Footwear Sector (Paris, 2018). Available at: <https://www.oecd.org/corporate/mne/responsible-supply-chains-textile-garment-sector.htm>

OECD/FAO, OECD-FAO Agricultural Outlook 2022-2031 (OECD Publishing, Paris, 2022), available at: <https://doi.org/10.1787/f1b0b29c-en>

Quid. Homepage. Available at: <https://www.quidorg.it/>

Reblend. Homepage. Available at: <https://www.reblend.nl/>

Reet Aus. Homepage. Available at: <https://www.reetaus.com/>

Regulation (EU) 2017/821 of the European Parliament and of the Council of 17 May 2017 laying down supply chain due diligence obligations for Union importers of tin, tantalum and tungsten, their ores, and gold originating from conflict-affected and high-risk areas. Available at: <https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEXpercent3A32017R0821>

Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celexpercent3A32013R1380>

Reverse Resources. Homepage. Available at: <https://reverseresources.net/about>

Sofia Declaration on the Green Agenda for the Western Balkans, 10 November 2020. Available at: <https://www.rcc.int/docs/546/sofia-declaration-on-the-green-agenda-for-the-western-balkans-rn>

Statista (2022). Leading mining countries worldwide in 2018, based on mineral production value (in billion USD). Available at: <https://www.statista.com/statistics/1114898/leading-mining-countries-worldwide-based-mineral-production-value/#:~:text=Inpercent202018percent20Cpercent20Chinapercent20waspercent20by,productionpercent20valuepercent20thepercent20samepercent20year>

Statista, “Global apparel market - statistics & facts”, 3 March 2022. Available at https://www.statista.com/topics/5091/apparel-market-worldwide/#topicHeader__wrapper

The European Commission (2020). Circular economy action plan for a cleaner and more competitive Europe, June. Available at: <https://op.europa.eu/en/publication-detail/-/publication/45cc30f6-cd57-11ea-adf7-01aa75ed71a1/language-en/format-PDF/source-170854112>

The European Commission (2022). Proposal for a Directive on empowering consumers for the green transition and annex, March. Available at: https://ec.europa.eu/info/publications/proposal-empowering-consumer-green-transition-and-annex_en

The European Commission (2022). Proposal for Ecodesign for Sustainable Products Regulation, March. Available at: https://environment.ec.europa.eu/publications/proposal-ecodesign-sustainable-products-regulation_en

The European Commission, EU strategy for sustainable and circular textiles. Available at: https://environment.ec.europa.eu/strategy/textiles-strategy_en

The European Commission, European New Consumer Agenda 2021. Available at <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEXper cent3A52020DC0696>

The European Commission, Initiative on substantiating green claims. Available at: https://ec.europa.eu/environment/eussd/smgp/initiative_on_green_claims.htm

The European Commission, Proposal for a Directive on corporate sustainability due diligence and annex, 23 February 2022. Available at: https://ec.europa.eu/info/publications/proposal-directive-corporate-sustainable-due-diligence-and-annex_en

The European Commission. The Environmental Footprint Pilots. Available at: https://ec.europa.eu/environment/eussd/smgp/ef_pilots.htm

The Law of the Republic of Serbia dated May 29, 2009, "On Food Safety" ("Official Gazette R.S." No.41/09). Available at: <http://www.minpolj.gov.rs/dokumenti/zakoni/>

The product selection is made in accordance with Standard International Trade Classification (SITC) Revision 3. Available at: https://unctadstat.unctad.org/EN/Classifications/DimSitcRev3Products_Official_Hierarchy.pdf

The Renewal Workshp. Homepage. Available at: <https://renewalworkshop.com/>

The Restory. Homepage. Available at: <https://www.the-restory.com/>

The system «Pool of electronic passports of trade items» of the Republic of Belarus. Available at: <http://epass.by/?rvn=1>

UNC. Homepage. Available at: <https://www.udicon.org/2019/07/08/all-you-need-is-food-informare-per-prevenire-il-food-waste/>

UNCTAD. Research Paper No. 84 UNCTAD/SER.RP/2022/4. Growing the good and shrinking the bad: Output-emissions elasticities and green industrial policy in commodity-dependent developing countries, May. Available at: https://unctad.org/system/files/official-document/ser-rp-2022d4_en.pdf

UNCTAD Report maps manufacturing pollution in sub-Saharan Africa and South Asia, 24 September. Available at: <https://unctad.org/news/report-maps-manufacturing-pollution-in-sub-saharan-africa-and-south-asia>

UNCTAD, Commodities and Development Report 2019: Commodity Dependence, Climate Change and the Paris Agreement, 11 September 2019. Available at <https://unctad.org/webflyer/commodities-and-development-report-2019#:~:text=Theper cent202019per cent20editionper cent20ofper cent20the,changeper cent20andper cent20theper cent20commodityper cent20sectors.>

UNCTAD, State of Commodity Dependence 2021, Geneva, 2021. Available at: <https://unctad.org/system/files/ofThe-Sustainable-Development-Goals-Report-2022.pdf> (un.org) ficial-document/ditcom2021d2_en.pdf

UNDP, New digital platform for food donation „Plate by Plate” launched, 24 February 2021. Available at: <https://www.undp.org/serbia/news/new-digital-platform-food-donation-per centE2per cent80per cent9Eplate-plateper centE2per cent80per cent9C-launched>

UNECE, “Accelerating action for a sustainable and circular garment and footwear industry: which role for transparency and traceability of value chains?”, policy paper ECE/TRADE/449, 2020.

UNECE, “Accelerating action for a sustainable and circular garment and footwear industry: which role for transparency and traceability of value chains?”, policy paper, 2020. Available at https://unece.org/DAM/trade/Publications/ECE_TRADE_449-AcceleratingTanspRraceabilityTextile.pdf

UNECE, Draft United Nations Resource Management System: Principles and Requirements, 14 April 2022. Available at <https://unece.org/sed/documents/2022/04/session-documents/draft-unrms-principles-and-requirements>

UNECE, Recommendation No.46: Enhancing traceability and transparency of sustainable value chains in the garment and footwear sector (ECE/TRADE/463), January 2022. Available at <https://unece.org/trade/publications/recommendation-no46-enhancing-traceability-and-transparency-sustainable-value>

UNECE, Simply Measuring - Quantifying Food Loss and Waste: UNECE food loss and waste measuring methodology for fresh produce supply chains, April 2022. Available at: <https://unece.org/info/publications/pub/366261>

UNICEF, Children's Rights in the Garment and Footwear Supply Chain: A Practical Tool for Integrating Children's Rights into Responsible Sourcing Frameworks, Article One, June 2020. Available at <https://www.unicef.org/media/70121/file/Childrens-rights-in-the-garment-and-footwear-supply-chain-2020.pdf>.

United Nations Framework Classification for Resources Update 2019 (ECE ENERGY SERIES No. 61). Available at: <https://unece.org/info/Sustainable-Energy/UNFC-and-Sustainable-Resource-Management/pub/2772>

United Nations Global Compact Office (2014). A Guide to Traceability: A Practical Approach to Advance Sustainability in Global Supply Chains. Available at <https://www.unglobalcompact.org/library/791>

United Nations, "Transforming extractive industries for sustainable development", May 2021, available at <https://unece.org/sites/default/files/2021-05/SGpercent20Policypercent20Briefpercent20Extractivespercent20NOemb.pdf>

UN-Water, Summary Progress Update 2021: SDG 6 — Water and Sanitation for All, July 2021. Available at https://www.unwater.org/app/uploads/2021/12/SDG-6-Summary-Progress-Update-2021_Version-July-2021a.pdf

USAID, Feed the Future Tajikistan Agriculture and Land Governance Activity: Value Chain Analysis, 31 March 2021. Available at https://pdf.usaid.gov/pdf_docs/PA00XWQ1.pdf

Vanhulley. Homepage. Available at: <https://www.vanhulley.com/>

Veolia. (2018). In Lyon McDonalds's trucks run on recycled burgers! Available at: <https://web.archive.org/web/20190729205714/https://www.livingcircular.veolia.com/en/industry/lyon-mcdonalds-trucks-run-recycled-burgers>

Veras. Homepage. Available at: <https://verasvintage.dk/>

Vestiaire Collective. Homepage. Available at: <https://fr.vestiairecollective.com/>

Vinted. Homepage. Available at: <https://www.vinted.co.uk/>

Vitelco. Homepage. Available at: <https://www.vitelco.nl/de/aktuelles/vitelco-reveal-s-fully-traceable-calf-leather/#:~:text=Thepercent20leatherpercent20divisionpercent20ofpercent20Dutch,ispercent20marketedpercent20asperpercent20ReVeal>.

Wool Line. Homepage. Available at: <https://wool-line.com/en/>

World Bank Group, Minerals for Climate Action: The Mineral Intensity of the Clean Energy Transition, 2020. Available at: <https://pubdocs.worldbank.org/en/961711588875536384/Minerals-for-Climate-Action-The-Mineral-Intensity-of-the-Clean-Energy-Transition.pdf>

World Bank, "How much do our wardrobes cost to the environment?", 23 September 2019. Available at: <https://www.worldbank.org/en/news/feature/2019/09/23/costo-moda-medio-ambiente>

World Economic Forum, Digital traceability: a framework for more sustainable and resilient value chains, September 2021. Available at <https://www.weforum.org/whitepapers/digital-traceability-a-framework-for-more-sustainable-and-resilient-value-chains>

Ellen Macarthur Foundation, Circular economy introduction. Available at <https://ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview>