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**COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN
PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL
COMMITTEE AND THE COMMITTEE OF THE REGIONS**

on a revised monitoring framework for the circular economy

{SWD(2023) 306 final}

1. Introduction

In 1972, the Club of Rome's report, *The Limits to Growth*, warned about the environmental and climate consequences of the current unsustainable growth model, which was based on the global consumption of 28.6 billion tonnes of materials every year. In the 50 years since the publication of this report, the trend of ever-increasing demand for resources has become even more worrisome. Since 1972, the global use of materials has nearly quadrupled, rising to 54.9 billion tonnes per year in 2000 and surpassing 100 billion tonnes in 2019. Worldwide material use is projected to reach 167 billion tonnes per year in 2060¹.

The natural regeneration capacity of the planet has not been able to absorb the exponential rise in the extraction of resources, which are then quickly discarded into our atmosphere, water bodies and land². Nature's global and interconnected system has been knocked off balance, and is now reaching breaking point, as the devastating impacts of climate change and biodiversity loss are severely felt around the globe.

Resource extraction and resource processing are responsible for half of total greenhouse-gas (GHG) emissions and more than 90% of biodiversity loss and water stress³. Cutting GHG emissions and reducing primary material use are two sides of the same coin. The important link between biodiversity and the circular economy is increasingly recognised. Unless we radically transform the way we use materials to meet our needs, promoting change throughout our systems of production and consumption, we can neither substantially reduce our emissions, nor preserve nature for the current and future generations.

Most materials, together with the embedded energy and other resources used in their production, are lost at the end of their initial economic cycle: global material circularity⁴ decreased from 9.1% in 2018 to 7.2% currently⁵. In the EU, 8.1 billion tonnes of materials are processed into energy or products annually, but only 0.8 billion tonnes of this originate from recycling. Although the rate of circularity of material use in the EU has been increasing and in 2021 was at 11.7%, 3.4 percentage points up from 2004, there is significant potential for improvement, in particular by increasing the use of recycled materials and reducing the amount of materials used in the economy.

The EU economy depends on raw materials from the rest of the world. In 2021, the EU imported 1.6 billion tonnes of materials from the rest of the world⁶. Metal ores and fossil-energy materials accounted for 58% of these imports⁷. Moreover, the EU's supply of critical raw materials, which are required for the green transition, is exposed to significant risk and often associated with adverse environmental impacts in third countries. As part of its recent initiatives on critical raw materials, the EU is stepping up efforts in assuring their circularity

¹ [Global Material Resources Outlook to 2060.](#)

² [Circularity Gap Report 2022.](#)

³ [International Resource Panel report 'Global Resources Outlook 2019'.](#)

⁴ The circularity measures the share of secondary materials on overall material input in the economy.

⁵ [Circularity Gap Report 2023.](#)

⁶ Eurostat, [Material Flow Accounts](#), [Statistics Explained article.](#)

⁷ Eurostat, [Statistics Explained article.](#)

in the broad sense⁸, and in particular strengthening the recycling capacities, systems and technologies to produce secondary materials in the EU⁹.

By reducing EU demand for primary resources and energy, the transition to a more circular economy has the potential to increase our resilience, reduce our dependencies on imports of energy and materials, while contributing to the clean energy transition. This is even more important in the wake of the COVID-19 crisis and in the context of the ongoing brutal war of aggression by Russia against Ukraine. The contribution of the circular economy to security of supply is particularly important as the demand for key raw materials from the renewable-energy and e-mobility sectors will increase greatly between 2030 and 2050¹⁰.

The transition to a circular economy is therefore a unique opportunity to make our economy more sustainable, competitive and resilient: it contributes to climate neutrality; preserves biodiversity and ecosystems; improves security of supply and alleviates strategic dependencies on raw materials; creates local decent and green jobs; and boosts innovation. Circularity is a key instrument to foster competitiveness and offers a major opportunity to increase resource productivity, employment and growth as highlighted in the long-term competitiveness strategy of the EU looking beyond 2030¹¹. Doing this will also help achieve the UN's sustainable development goals¹². Therefore, monitoring trends in areas related to the circular economy is needed in order to assess the effectiveness of policies and actions and help identify gaps and success stories across the EU.

In January 2018, the European Commission adopted **the EU monitoring framework for the circular economy**¹³ composed of a set of key indicators to track progress in the EU and in Member States. Other EU institutions welcomed the monitoring framework and in the context of its revision they have emphasised the need to put a greater focus on the production side rather than focusing on waste and to use footprint indicators.

In line with the commitment in the new circular economy action plan for a cleaner and more competitive Europe¹⁴, this communication presents **a revised monitoring framework that captures the circular economy focus areas and the interlinkages between circularity, climate neutrality and the zero pollution ambition.** This monitoring framework takes account of the circular economy priorities in the context of the European Green Deal, the 8th environment action programme, the 2030 agenda for sustainable development and the EU's security of supply and resilience objectives.

2. Revision of the EU monitoring framework for the circular economy

⁸ [COM\(2023\) 165 final](#).

⁹ [COM\(2023\) 160 final](#).

¹⁰ [In-depth reviews of strategic areas for Europe's interests | European Commission \(europa.eu\)](#).

¹¹ [COM\(2023\) 168 final](#).

¹² https://commission.europa.eu/strategy-and-policy/international-strategies/sustainable-development-goals_en

¹³ [COM\(2018\) 29 final](#) and [SWD\(2018\) 17](#).

¹⁴ [COM\(2020\) 98 final](#).

The **new monitoring framework aims to provide a comprehensive overview** by measuring direct and indirect benefits of increasing circularity. It comprises **11 indicators grouped into 5 dimensions**: (1) production and consumption; (2) waste management; (3) secondary raw materials; (4) competitiveness and innovation; and (5) global sustainability and resilience. It includes some new indicators, notably:

- **Material footprint**, measuring the overall use of materials and reflecting the amount of materials embedded in overall consumption, including imported goods;
- **Resource productivity**, measuring the amount of GDP from materials use and demonstrating the efficiency in using materials in the production of goods and services;
- **Consumption footprint**, comparing consumption to the planetary boundaries for 16 impact categories based on a life-cycle assessment and according to the 5 main areas of consumption (food, mobility, housing, households goods and appliances);
- **GHG emissions from production activities**, measuring the GHG emissions produced by production sectors (therefore excluding emissions from households) and reflecting the contribution of the circular economy to climate neutrality;
- **Material dependency**, measuring the share of imported materials on overall material use, describing how much the EU depends on imports of materials and reflects the contribution of the circular economy to security of supply of materials and energy and to the EU's open strategic autonomy¹⁵. An indicator on self-sufficiency for raw materials has been used since 2018.

Further changes in the sub-indicators are made to reflect methodological changes in some indicators or further align them with policy developments¹⁶.

The revision of the monitoring framework has taken into account the responses to the public consultation on the call for evidence¹⁷, as well as discussions with Member State representatives and stakeholder experts. The indicators also consider national, international¹⁸ and stakeholder¹⁹ actions on monitoring the circular economy and sustainability²⁰.

The indicators in the revised framework are consistent with other EU monitoring tools, in particular the monitoring framework for the 8th environment action programme²¹; the zero-pollution monitoring and outlook²²; the EU indicators for the sustainable development goals²³; and the resilience dashboard²⁴.

¹⁵ [Shaping and securing the EU's Open Strategic Autonomy by 2040 and beyond](#).

¹⁶ For further details, see SWD(2023) 306.

¹⁷ https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13465-Circular-economy-monitoring-framework-revision-feedback_en?p_id=30764770.

¹⁸ In particular, the [Planetary pressures adjusted- Human Development Index](#) from UNDP, IRP reports in 2020 and 2021, and the [circularity gap reports](#).

¹⁹ In particular, the [Bellagio principles on monitoring the circular economy](#).

²⁰ For further details, see SWD(2023) 306.

²¹ [COM\(2022\) 357 final](#).

²² [COM\(2022\) 674 final](#).

Most – but not all – indicators are based on official statistics sourced by Eurostat. All indicators meet the criteria of relevance, acceptance, credibility, ease of use and robustness²⁵, and are based on existing data as much as possible.

The framework relies to a large extent on high-quality statistics that are available for all EU Member States, mostly using data from the European Statistical System and the research community. When appropriate, the Commission, in cooperation with the relevant stakeholders, will investigate the use of new data sources to further improve the monitoring framework in the future.

Eurostat will publish and maintain the new monitoring framework on its website, continuously updating the indicators. This website will continue to serve as the Commission’s entry point for finding all information about it, including indicators, time series and visualisation tools²⁶.

3. Indicators in the monitoring framework for the circular economy 2023

No	Indicator	Relevance	Source
Production and consumption			
1a-b	Material consumption 1a Material footprint (tonnes per capita) 1b Resource productivity (EUR/kg)	Decreasing the consumption of materials indicates decoupling economic growth from resource use.	Eurostat
2	Green public procurement*	Public procurement accounts for a large share of consumption and can drive the circular economy.	European Commission
3a-f	Waste generation 3a Total waste generation per capita (kg per capita) 3b Total waste generation (excluding major mineral waste) per GDP (kg per EUR) 3c Generation of municipal waste per capita 3d Food waste (kg per capita) 3e Generation of packaging waste per capita (kg per capita) 3f Generation of plastic packaging waste per capita (kg per capita)	In a circular economy, waste generation is minimised.	Eurostat
Waste management			
4a-b	Overall recycling rates 4a Recycling rate for municipal waste (%) 4b Recycling rate for all waste excluding major mineral waste (%)	Increasing recycling is part of the transition to a circular economy.	Eurostat
5a-c	Recycling rates for specific waste streams 5a Recycling rate for overall packaging waste (%) 5b Recycling rate for plastic packaging waste (%) 5c Recycling rate for electrical and electronic equipment waste that is separately collected (%)	Progress in recycling key waste streams is essential for sustainability and resilience.	Eurostat
Secondary raw materials			

²³ [EU SDG indicators and progress monitoring report](#).

²⁴ [EU Resilience dashboard](#).

²⁵ Also known as the ‘RACER’ criteria for indicators.

²⁶ <https://ec.europa.eu/eurostat/web/circular-economy>.

6a-b	Contribution of recycled materials to demand for raw materials 6a Circular material use rate (%) 6b End-of-life recycling input rates (%)	In a circular economy, secondary raw materials are commonly used to make new products.	Eurostat, other European Commission services
7a-c	Trade in recyclable raw materials 7a Imports from outside the EU (tonnes) 7b Exports to outside the EU (tonnes) 7c Intra-EU trade (tonnes)	Trade in recyclables reflects the importance of the internal market and global participation in the circular economy.	Eurostat
Competitiveness and innovation			
8a-c	Private investments, jobs and gross value added related to circular economy sectors 8a Private investments (% GDP) 8b Employment (% employment) 8c Gross value added (% GDP)	The circular economy can contribute to the creation of jobs and growth.	Eurostat
9	Green innovation 9 Patents related to waste management and recycling (number and number per million inhabitants)	Innovative technologies related to the circular economy boost the EU's global competitiveness.	Joint Research Centre based on PATSTAT
Global sustainability and resilience			
10a-b	Global sustainability 10a Consumption footprint (index 2010=100 and times the planetary boundaries is transgressed) 10b GHG emissions from production activities (kg per capita)	Consumption footprint indicates the extent to which production and consumption systems are within planetary boundaries. The circular economy contributes to climate neutrality.	Joint Research Centre and Eurostat
11a-b	Resilience 11a Material import dependency (%) 11b EU self-sufficiency for raw materials (%)	The circular economy contributes to the security of supply of raw materials and helps to address supply risks, in particular for critical raw materials.	Eurostat, other European Commission services

* Indicator under development. CEAP2: circular-economy action plan 2 adopted in 2020.

4. Applying the monitoring framework: main trends

The 11 indicators make it possible to measure progress towards both legal/aspirational targets and broader policy objectives in the area of the circular economy. Some material-specific sub-indicators provide important information to policy makers that will enable them to assess progress in key supply chains and materials.

Production and consumption

There has been mixed progress in shifting to more circular forms of production and consumption in recent years. EU production has become more resource-efficient but EU consumption of materials and generation of waste are both very high and need to decrease in the future.

The EU's estimated material footprint, also referred to as raw material consumption (RMC), was **13.7 tonnes per capita in 2020**. Non-metallic minerals is the largest material category, and changes in this category are highly determined by the level of construction (and activity in construction-related sectors) in different Member States.

Since 2000, the resource productivity of the EU economy has increased by about 35%, indicating progress in decoupling economic growth from resource use. The increase can be explained by processes that use materials more efficiently but also by the outsourcing of material-intensive production to other parts of the world.

The EU spends around 14% of GDP (around EUR 2 trillion per year) on the purchase of services and goods through public procurement. **Green public procurement** can therefore be a powerful tool to boost the circular economy and green innovation. Data for an indicator on green public procurement will become available in 2024 through a questionnaire on public procurement that will be completed by Member States.

In 2020, the total waste generated in the EU by all economic activities and households amounted to 2.15 billion tonnes, i.e. **4.8 tonnes of waste were generated per EU inhabitant in 2020. Overall waste generation decreased by almost 3%** between 2010 and 2020. Around two thirds (64%) of the total waste generated in the EU in 2020 was major mineral waste. Major mineral waste is closely linked to construction, demolition, mining and quarrying, which are significant sectors in some Member States. In this ten-year period, there was **limited decoupling** of the quantity of waste generated (excluding major mineral waste) from GDP.

EU **municipal waste** generation per capita, representing 10% of all waste, increased to **530 kg in 2021** compared to 503 kg per capita in 2010. Reducing **food waste**²⁷ has enormous potential to save the resources we use to produce the food we eat and is among the drivers for food security²⁸. The **EU generated 59 million tonnes of food waste** in 2020, equivalent to 131 kg per capita.

The generation of packaging waste in the EU reached 178 kg per capita in 2020, up 17% since 2010. 19% of all EU packaging waste is plastic. **Volumes of plastic packaging waste increased by 25% between 2010 and 2020**, the greatest increase of all packaging waste streams. On average, **each European was responsible for 35 kg of plastic packaging waste in 2020**. Figures for 2021 will provide insights into the effects of the COVID-19 pandemic on the generation of plastic packaging waste.

Waste management

Much progress has been made in recent years in managing waste more sustainably. However, large differences among Member States remain and there is much room for improvement in some waste streams.

²⁷ https://ec.europa.eu/food/safety/food_waste/eu_actions_en.

²⁸ [SWD \(2023\) 4 final](#).

EU recycling rates for municipal waste increased from 38% to 49% between 2010 and 2021. Some countries have met or are already approaching the 2030 recycling target of 60%²⁹ and one country has already met the 2035 target of 65%³⁰. **Recycling rates for packaging waste was stable at 64%** in the EU between 2010 and 2020. The EU recycling rate for **plastic packaging** is significantly lower than the rate for all packaging waste, at around **38%**.

The share of **collected waste electrical and electronic equipment** that is either reused or recycled has increased in the EU, from 81.8% in 2010 to **83.4% in 2020**.

Secondary raw materials

The contribution of recycled materials to overall material demand is relatively low. Trade in secondary raw materials is increasing both within the EU and with non-EU countries.

In 2021, recycled materials only satisfied around 11.7% of EU demand for materials, 1.4 percentage points more than in 2011. For a large number of materials, including many critical raw materials, the contribution made by recycled materials to satisfying demand for raw materials is still small to negligible. For many speciality metals and rare-earth elements, the end-of-life recycling input rate is around 1%, while end-of-life recycling rates reach 16% for nickel and 22% for cobalt, both of which are raw materials used in batteries³¹.

In 2021, the EU was overall a net importer of recyclable raw materials. However, the indicator on trade in recyclable waste shows that the EU is currently a net exporter of **some major recyclable waste streams** (including ‘iron and steel’, ‘copper, aluminium and nickel’ and ‘paper and cardboard’) and a net importer of precious-metals waste. **Trade within the EU** of waste plastics, paper, cardboard, copper, aluminium, nickel and precious metals **increased considerably** between 2004 and 2021, enabling businesses to reap the benefits of the EU’s internal market for secondary raw materials.

Competitiveness and innovation

The circular-economy sectors have grown in recent years when measured by investments, value added, and jobs. These sectors have also become more innovative.

In 2021, **private investment** in specific economic sectors relevant to the circular economy, namely reuse and recycling activities, are estimated to have been around **EUR 121.6 billion** in the EU (i.e. 0.8% of EU GDP). In the same year, there were **4.3 million jobs** in these sectors, an **increase of 11%** compared with 2015. The circular-economy sectors created around EUR 299 billion of **value added** in 2021, which represents an **increase of 27%** compared with 2015.

²⁹ [Directive \(EU\) 2018/851](#).

³⁰ Member States’ figures are more comparable as they are based on a common method.

³¹ Based on the assessment of the critical raw materials list 2023.

The number of EU registered **patents** on recycling and secondary raw materials **increased by 14%** between 2000 and 2019.

Global sustainability and resilience

EU consumption leads to impacts which are crossing certain planetary boundaries, and the circular economy contributes to climate neutrality. The EU is dependent on material imports, in particular for some critical raw materials needed for the green and digital transition.

The EU's **consumption footprint** increased by 4% between 2010 and 2021. The Commission now estimates that the EU has clearly transgressed the planetary boundaries for five impacts (particulate matter, ecotoxicity in freshwater, climate change, use of fossil-based resources, and use of mineral and metal resources). Consumption of food (in particular animal-based products) is emerging as one of the main drivers of impacts generated by the average EU citizen³².

EU GHG emissions from production activities decreased by **around 25% in 2008-2021**.

In 2021, the **EU's material import dependency was 22.9%**, a slight increase from 2000. The EU's economy is almost self-sufficient in the supply of non-metallic minerals (such as those destined for construction), while for metal ores and fossil-energy materials the EU is highly dependent on imports from the rest of the world (with dependencies of 52% and more than 71%, respectively).

The indicator on **self-sufficiency** in the supply of raw materials shows that, for **critical raw materials**, the EU relies on imports to a large extent. For example, for refined rare earth elements and refined magnesium, the EU imports 100% of its consumption from China. This highlights the need for secure access and diversification of supply. Many of these materials are needed to achieve the EU's objective of a sustainable, low-carbon, resource-efficient and competitive economy, for instance cobalt for batteries used in electric vehicles, and silicon for solar panels.

5. Conclusions

The circular economy action plan for a cleaner and more competitive Europe emphasises that the EU needs to accelerate the transition towards a regenerative growth model, advance towards keeping its resource consumption within planetary boundaries, strive to reduce its consumption footprint, double its circular material use rate, significantly reduce total waste generation and halve the amount of residual (non-recycled) municipal waste in this decade.

The adoption of the revised EU circular economy monitoring framework is timely as under the European Green Deal the Commission has launched a number of legislative initiatives to

³² <https://eplca.jrc.ec.europa.eu/ConsumptionFootprintPlatform.html>.
<https://publications.jrc.ec.europa.eu/repository/handle/JRC128571>

accelerate the circular economy transition, such as the regulations on batteries³³, Ecodesign for sustainable products³⁴, packaging and packaging waste³⁵, waste shipments³⁶, and critical raw materials³⁷. Member States are also implementing recent amendments to EU law, such as the revision of the EU rules on waste adopted in 2018³⁸, and have been developing many national and regional approaches to promote the circular economy. Several EU funding programmes are available to support the transition to a circular economy, such as NextGenerationEU and the reforms and investments under the Recovery and Resilience Facility; the European Cohesion Policy Funds; Horizon Europe; and the LIFE programme.

The revised monitoring framework makes it possible to keep track of the progress made in the transition towards a resource-efficient, climate-neutral and resilient circular economy in the context of sustainable development. It will provide a key tool to assess policies put in place and to guide future actions, including in the context of specific assessments, such as the early warning reports to identify Member States at risk of not meeting the EU targets on recycling and landfilling of waste³⁹. It offers a sound basis for discussion at the annual circular economy stakeholder conferences⁴⁰, as well as for measuring national performance, including in the context of the Environmental Implementation Review⁴¹.

³³ [COM\(2020\) 798 final](#).

³⁴ [COM\(2022\) 142 final](#).

³⁵ [COM\(2022\) 677 final](#).

³⁶ [COM\(2021\) 709 final](#).

³⁷ [COM\(2023\)160 final](#).

³⁸ [Directive \(EU\) 2018/851](#).

³⁹ https://environment.ec.europa.eu/topics/waste-and-recycling/implementation-waste-framework-directive_en

⁴⁰ [Press release on the Circular economy stakeholders conference 2023](#).

⁴¹ https://environment.ec.europa.eu/law-and-governance/environmental-implementation-review_en#overview .