The Circularity Gap Report 2026

CGR 2026

The Value Gap

CIRCLE ECONOMY

Behind the cover

This aerial image of a drying lakebed captures the visible impacts of the overexploitation of natural resources. As landscapes degrade under pressure, they reveal the growing strain that the current linear economy places on the natural systems essential to life.

For the *Circularity Gap Report 2026*, the image symbolises the *Value Gap*: the value lost when resources are wasted rather than protected, valued, and kept in use. It serves as a visual reminder that linearity comes at an increasingly unaffordable cost.

Circle Economy is a non-profit organisation founded in 2011 and based in Amsterdam. Our vision is an economic system that ensures the planet and all people can thrive. We work with partners worldwide, equipping them with the insights, strategies, and tools to accelerate the circular economy transition.

Our international team combines research, data analysis, advisory services, and capacity-building programmes across four focus areas: finance, cities, employment, and value chains. Circle Economy is the organisation behind the Circularity Gap Report (CGR®), the leading global benchmark for measuring and tracking circularity.

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In support of the *Circularity Gap Report*

Arnold Tukker
Professor of Industrial Ecology and Distinguished professor, Leiden University; Senior researcher, TNO

'For the first time, this *Circularity Gap Report* includes an assessment of the Value Gap. While methodologically this is an inherently challenging topic to address with full scientific rigour, it represents a strategically valuable expansion of the report's scope. Money still drives most decisions in business and policy. Every new approach has to start somewhere, and over time the methodology will likely evolve as new data, tools and research become available.'

Delphine Garin
Manager, Circular Finance and Data, WBCSD

'By making economic value loss visible, the *Circularity Gap Report 2026: The Value Gap* provides a compelling case for companies to understand the strategic importance of transitioning to a circular economy. The report is a highly valuable resource, aligning closely with the Global Circularity Protocol for Business, which supports companies and their value chains in implementing effective circular strategies to close, narrow, and slow material loops—and ultimately help close the initial estimate of the €25.4 trillion Value Gap.'

Executive summary

Key insights

Initial estimate of the Value Gap suggests it amounts to €25.4 trillion (± €4.7 trillion) in avoidable annual economic value lost to linear material use, equivalent to almost 31% of global GDP. This means that for every €3 of economic value created globally, around €1 is lost due to linear material use. These losses are avoidable and represent a significant opportunity for circularity to enhance value recovery and long-term value retention across economies.

Existing economic metrics do not account for value loss to linearity. Conventional economic indicators such as GDP measure activity, not value retention or erosion, and therefore overlook resource depletion, waste, underutilisation, and stock depletion embedded in linear materials management. As a result, structural value loss remains largely invisible in economic decision-making.

The five pathways of value loss explored are processing losses, energy losses, food losses and waste, end-of-life waste, and premature deterioration of fixed capital. Targeting these pathways provides a comprehensive and actionable entry point for closing the Value Gap.

Value loss is structural and systemic, not marginal inefficiency. Most economic value is not lost at the margins through isolated inefficiencies in how materials are managed, but through the fundamental design of today's linear economy that locks in resource extraction, asset underutilisation, cost externalisation, and waste generation at scale.

Circularity is fundamentally about reducing resource use and maximising resource value over time, not just recycling materials. Incremental optimisation is insufficient; addressing value loss requires systemic redesign of how materials are sourced, used, retained, and circulated across the economy.

Reducing value loss can unlock trillions in economic value while strengthening resilience. By retaining materials at higher utility and preventing waste and underutilisation, economies can capture substantial economic gains while reducing environmental pressures, supply risks, and social externalities embedded in linear practices.

Closing the Value Gap requires coordinated action across value chains. No single actor can help address structural value loss alone. There is a significant opportunity for businesses, financiers, and policymakers to align innovation, investment, incentives, and regulation across value chains through standardised international frameworks such as the Global Circularity Protocol to shift from linear throughput maximisation to value retention at scale.

Circularity Gap Report 2026: The Value Gap

Economies worldwide fundamentally depend on materials, yet a significant portion of their value is lost at each stage of production, use, and disposal. Each year, an initial estimate of €25.4 trillion (± €4.7 trillion) in economic value is lost due to resource inefficiencies, premature product disposal, and underutilised assets. Compared with a Gross Domestic Product (GDP) of €82.6 trillion, this highlights the immense scale of material-related losses.

The Value Gap, introduced in this edition of the global *Circularity Gap Report*, quantifies, for the first time, the avoidable economic value lost through linear economic practices. It provides a concrete lens on the scale of inefficiencies in today's take-make-waste economy, revealing how and why value disappears. These losses reflect not only direct economic costs, but also hidden environmental and social burdens, including pollution, resource depletion, human health impacts and reduced labour productivity. This gap is not just a measure of loss—it represents an opportunity for circular interventions to retain more value, reduce waste generation, and strengthen long-term prosperity.

A new perspective on the potential of circularity

The Value Gap provides a pragmatic, economy-wide measure of how much avoidable economic value, expressed monetarily, is lost due to linear material use. For global comparability, value is primarily defined in economic terms and expressed in prices, using GDP as a proxy for total value creation. Within this framing, the methodology distinguishes between functional value—the utility embedded in materials, components and products—and created value, referring to the broader environmental and social impacts of economic activity that largely remain external to market prices.

The Value Gap represents the total avoidable value lost through inefficient material use (including energy and food), premature obsolescence and asset deterioration, and partially unpriced externalities. It is an absolute figure that can also be expressed relative to GDP (that is, as euros of avoidable value lost for every euro of value created), indicating how much value is lost for each unit of economic output generated. Accounting for the Value Gap alongside GDP would provide a more realistic measure of net value creation by revealing how much economic value is structurally lost to linearity and highlighting the scale of opportunity for circular strategies to retain and recover that value.

Main pathways of value loss

Value losses are grouped into five interlinked pathways that capture both short-term inefficiencies and longer-term asset erosion: processing losses, energy losses, food losses and waste, end-of-life waste, and the consumption of fixed capital (the deterioration of buildings, infrastructure, and machinery). Together, these pathways reveal how the current economic system not only creates value but also erodes it, highlighting the scale of opportunity for circular strategies to retain value.

The five value loss pathways capture the primary mechanisms through which economic value is lost in linear systems. The results are presented as a range to reflect methodological uncertainty, data limitations, and variability in underlying assumptions.

Processing losses: €904.2 billion (± €112.5 billion)

Value lost during the transformation of raw materials into semi-finished or final products due to inefficiencies, defects, and reduced yield.

Energy losses: €8.7 trillion (± €1.6 trillion)

Inefficiencies across the energy system, from extraction to end use, where a large share of input energy is wasted and does not deliver useful service.

Food losses and waste: €650.7 billion (± €28 billion)

Edible food that exits the supply chain without being consumed, including losses during storage, transport, retail, and final consumption.

End-of-life waste: €10.0 trillion (± €1.2 trillion)

Products and materials discarded prematurely, representing residual material and product value that is not recovered.

Consumption of fixed capital: €5.2 trillion (± €1.7 trillion)

Value lost as long-lived assets such as infrastructure, machinery, and buildings deteriorate faster than necessary due to underuse, poor maintenance, or obsolescence.

Mechanisms driving value loss

Value loss can occur through four intertwined mechanisms that explain how and why materials, products, and assets fail to reach their full potential:

1. **Mismanagement of materials and products:** Inefficiencies in handling materials and assets, often due to insufficient technology, infrastructure, or supply-chain coordination.
2. **Premature obsolescence:** Products or assets discarded before the end of their useful life, driven by design choices, user behaviour, technological innovations or regulatory factors.
3. **Premature deterioration:** Avoidable wear, damage, or underuse of long-lived assets, reducing their productive value over time.
4. **Internalisation of shadow costs:** The pricing of negative environmental and social externalities such as pollution, greenhouse gas emissions, and health impacts.

Together, these mechanisms help interpret why value is lost (the underlying processes that generate these outcomes), revealing where circular interventions can deliver some of the greatest economic impact.

Action for key stakeholders

Achieving circularity at scale requires collaboration among businesses, policymakers, and financiers to help address systemic value loss and unlock economic, social, and environmental opportunities. Closing the Value Gap is a shared opportunity to help strengthen economic resilience.

Businesses

- **Build a holistic business case for circular value creation.** Systematically identify and quantify value losses to uncover circular opportunities that can deliver financial, strategic, and risk-related benefits. Focus on long-term value creation beyond short-term returns.
- **Innovate and scale circular business models.** Engage in innovative circular business models based on their market readiness across technology, finance, and regulation. Scale proven solutions across core product portfolios and embedded into core mainstream operations to help unlock system-level impact.
- **Collaborate across value chains to unlock system-level value.** Coordinate beyond individual firms, with shared data, aligned incentives, and joint infrastructure to enable economies of scale and more reliable circular material flows.

Financiers

- **Integrate resource-use maximisation into decision-making.** Factor repairability, durability, and recoverability into investment and lending assessments. This helps recognise long-term value retention.
- **Assess exposure to resource-related risks.** Evaluate vulnerabilities in supply chains and asset lifetimes. Understanding risk can support more resilient portfolios.
- **Reorient capital flows toward resource-efficient investments.** Shift financing to durable, recoverable, and high-value assets. This encourages systemic adoption of circular practices.

Policymakers

- **Support target-setting.** Setting goals and science-based targets could help optimise resource extraction and consumption and guide businesses and societies toward sustainable practices.
- **Examine true pricing mechanisms.** Evaluate how to best price externalities so that market prices reflect full costs. Correcting price signals encourages circularity and reduces systemic waste.
- **Consider economic instruments.** Recognise how taxes and incentives can reduce value loss, making circular practices more profitable and discouraging resource-intensive behaviour.

1 Introduction

Rethinking value for a circular economy

Each day, billions of euros' worth of materials disappear. These losses often go unnoticed, but their consequences are significant. Food spoils along supply chains, raising household costs. Electronics are discarded long before their potential is exhausted. Homes are underutilised despite widespread housing shortages. Clothing is often worn briefly and discarded; inventories accumulate unused in warehouses. Beyond the immediate economic waste, these losses carry hidden environmental and social costs such as pollution, resource depletion, and unequal access to essential goods that conventional measurements of value rarely capture, while also undermining the productivity and resilience of the resources and systems involved. These are symptoms of a deeper structural challenge: a linear economic model that undervalues natural resources, underutilises produced assets, and enables premature disposal.

The environmental impacts of this model are significant. Resource use has tripled since 1970, and more than half of global greenhouse gas emissions, most biodiversity loss, and water stress stem from the extraction and processing of materials.[1] Human-made materials now outweigh all living biomass.[2] Yet this surge in material consumption is no longer delivering an increasing return. Global resource productivity—the economic output generated per unit of material used—has effectively stalled over the past decade.[3] Businesses and economies are consuming more material inputs without real efficiency gains. With this in mind, the circular economy is not only a key approach to help reduce ecological pressures but also represents a significant economic opportunity.

The *Circularity Gap Report (CGR®) 2026* shifts the lens from environmental indicators to an economic perspective by asking a fundamental question: *What is the extent of avoidable value lost through linear and inefficient economic practices?*

Answering that question requires confronting a deceptively simple premise: What does value mean? Value is not only a price tag. It is a multidimensional concept that has preoccupied economists and philosophers for centuries, capturing tensions between what something costs and what it is *worth*.[4] In practice, value is socially constructed, context-dependent, and often contested.[5] Prices are meant to reflect value in monetary terms, yet they rarely do. Market imperfections, externalities, incomplete information, and unequal power relations distort price signals. Critical natural capital like forests, soils, and freshwater systems underpin life, and the functioning of the economy, yet its depletion is not reflected in market valuations.[6] Likewise, a kilogram of critical raw materials in a medical device embodies far greater societal value than the same kilogram used in short-lived electronics, yet this difference is only partially visible in market prices.

This disconnect stems from the limits of the linear economic paradigm. Traditional economic theories typically focus on market exchange and consumption but overlook biophysical limits and long-term well-being. These also often overlook the usefulness of materials, their contribution to well-being, and the impacts generated across the life cycle. A circular economy requires a broader and more practical understanding of value, one grounded in how materials and products accumulate and lose value across their entire life cycle. A useful way to visualise this is the idea of a 'value hill' (Figure one). In the early, upstream stages of production, value is created as a myriad of raw materials are extracted, refined, and processed. These materials—metals, minerals, plastics, glass—are transformed into specialised components through energy- and skill-intensive processes. Midstream, these components are assembled into complex final products. By the time a product reaches the final user, it embodies not just materials and energy but also design, labour, knowledge, and technology.

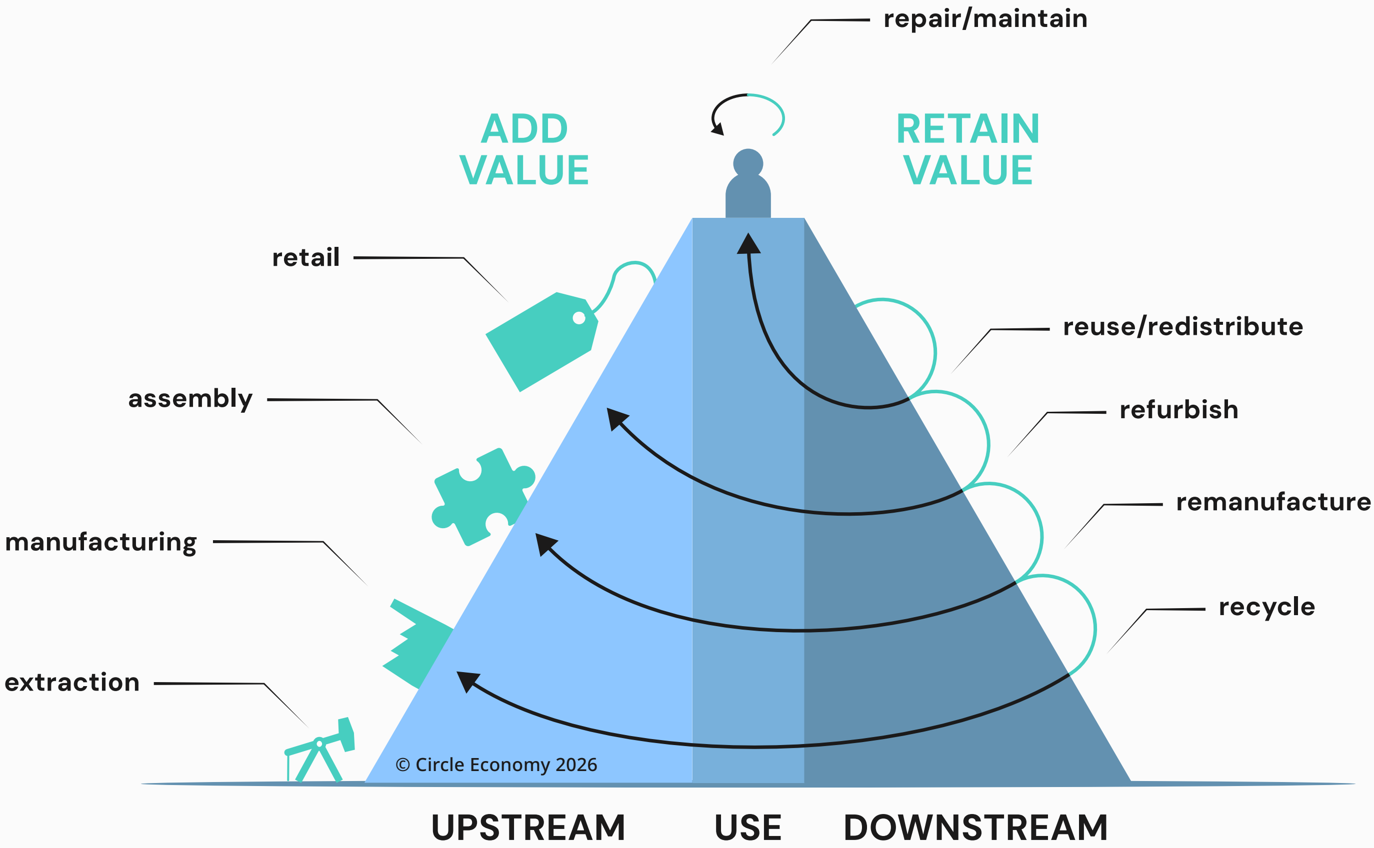

Figure one: Visual depiction of the value hill, showing how value is categorised across the product lifecycle: pre-use (upstream), in-use, and post-use (downstream) phases of materials. Source: [Circle Economy]

Across these stages—extraction, processing, manufacturing, use, and end-of-life—value is both created and destroyed. Inefficiencies in supply chains can lead to material losses; premature disposal shortens the useful life of well-functioning products; and the environmental and social costs of extraction, pollution, and unsafe working conditions remain largely unaccounted for in market prices. These hidden losses and costs accumulate along the value hill, leaving society to bear the consequences. Circular approaches aim to help reshape this trajectory by extending product lifetimes, improving reuse and repair, and recovering the value of materials at the end of life, which helps ensure that value loss is minimised and the value created is not squandered.

Ultimately, rethinking value is fundamental to rethinking the economy itself. At its core, value signals three things. First, it reflects usefulness: how much a material or product contributes to something people need. Second, scarcity: how limited or difficult it is to replace a resource or product. Third, complexity: the skill, technology, resources and energy embedded in its production.[7] But value also signals purpose: how well essential systems such as nutrition, housing, and mobility deliver well-being equitably, efficiently, and sustainably. Seen this way, value links resources, economies, and societies. A circular economy requires value frameworks that recognise the contribution of resources to human flourishing, account for ecological limits, and help address the broader impacts of resource management. Only with a richer, more holistic understanding of value can the economic and social potential of circularity be unlocked, and the global Value Gap closed.

From material gaps to value gains

The last edition of the global CGR® reported a Circularity Metric of 6.9%, meaning that 93.1% of materials entering the economy come from virgin sources.[8] While the Circularity Metric quantifies the share of materials entering the economy as secondary materials, it also highlights the economic implications of linearity. Low circularity not only signals large ecological impacts but also represents vast economic losses, both because nature is critical for the economy and its destruction poses systemic economic risks, and because linear practices can lead to wastefulness and overuse.

Building on this insight, the Value Gap quantifies the economic dimension of these material losses. It focuses on inefficient material use, including waste and losses caused by suboptimal technological processes, lack of infrastructure, or improper treatment throughout the supply chain. It also accounts for premature value loss driven by behavioural, regulatory, or economic failures that prevent long-lived products and assets from being fully utilised. Closing the Value Gap, therefore, means both avoiding value loss and preserving existing value, showing that circularity can translate directly into tangible economic gains.

Each inefficiency in resource management, discarded product, and underutilised asset, along with their associated environmental and social costs, represents not just a loss but also a missed opportunity: to avoid value loss and preserve existing value. Well-designed circular economy strategies that promote resource efficiency and sufficiency at the system level can translate into tangible economic, social, and environmental gains. They can also be a core, practical way of delivering human well-being for all within the ecological limits of the planet.

By connecting the material realities of the Circularity Gap with the economic insights of the Value Gap, this report reframes circularity as both an environmental imperative and a strategic opportunity, guiding businesses, financiers, and policymakers to focus on interventions with the highest potential for long-term socioeconomic and environmental value creation.

2 Sizing the Value Gap

Measuring value loss in the economy is a complex and multifaceted task. Conventional economic indicators—most notably Gross Domestic Product (GDP)—capture the monetary value of final goods and services produced over a specific period, but they fail to account for waste generation, the physical deterioration of fixed capital or the depletion of resources required to sustain that output, for example. This results in a critical gap in understanding value creation and economic performance.

To better understand the performance of today's global linear economy, it is necessary to account not only for value creation but also for value loss. This analysis thus seeks to help close this critical gap in understanding economic performance. To do so, the Value Gap translates inefficiencies in material use into monetary terms, making visible how much *avoidable* value is lost each year in a linear, take-make-waste paradigm, and how much of that loss could be avoided and value preserved through a more circular approach to material management.

Introducing the Value Gap

This chapter provides an overview of the methodology, data and tools used to measure the Value Gap. For more information, refer to the Methodology Document.

In operational terms, for practical reasons, the analysis adopts a deliberately pragmatic and largely business-as-usual approach to value measurement. This is opposed to more goal-oriented measurements such as the Human Development Index or Happiness Indices, which involve multi-dimensional frameworks that also quantify human well-being and life quality. To make value measurable on a global scale, it is primarily scoped as economic value expressed in monetary terms through prices. Within this framing, the analysis distinguishes between two main forms of value:

- ***Functional value*** refers to the utility embedded in materials, components, and products (what they are capable of doing) captured through their market value and considered as the main determinant of economic value creation.
- ***Created value*** encompasses the broader environmental and social impacts, both positive and negative, generated through economic activity, which largely remain external to prices under the prevailing linear paradigm (and are therefore at most only partially captured).[9] Examples include negative externalities such as pollution, as well as positive contributions like the provision of public goods such as public education, clean air, and public infrastructure.

In this analysis, inefficient material use (including for energy purposes) is treated as a loss of functional value during production, use, and end-of-life. Losses in created value are partially accounted for through the environmental and social costs of greenhouse gas emissions, as well as the environmental costs associated with unsorted waste.[10] This is how environmental and social costs, which are usually left out of market prices, are brought into the calculation in monetary terms.

Unpacking the Value Gap

The **Value Gap** represents the total **avoidable monetary value lost** in the economy due to linear practices, such as material losses and waste (including energy and food), the physical deterioration of assets, and unpriced environmental and social externalities. It is expressed as an absolute figure (in trillion euros) and can also be presented as a **ratio of total value loss to total value creation**, using GDP as a proxy for the latter. In this way, the Value Gap indicates how much value is lost to linearity for each unit of GDP generated. To understand this relationship, it is first necessary to examine how value creation is currently measured.

Value creation: How is it measured now?

Measuring economic value is inherently challenging. Making it relatively simple and intuitive requires translating diverse forms of human, social, and environmental contribution into a single, comparable metric. GDP was created to track economic activity by measuring the total output of goods and services in an economy. It was never designed to measure societal progress, well-being, sustainability, or long-term wealth. However, over time, GDP has become the dominant indicator for this purpose, widely used as the north star for economic performance and, by extension, human prosperity.[11]

While necessary for measuring economic output, this dominant metric is inherently flawed and narrowly focused for measuring value. GDP captures only the flow of value added today and ignores the depletion, degradation, or destruction of the (produced and natural) stocks that fundamentally underpin the generation of that value.[12] For example, while newly created physical capital assets such as buildings, infrastructure and machinery are accounted for, the simultaneous deterioration of existing ones is not.[13]

Similarly, the deterioration and depletion of natural resources, including minerals, non-renewable energy sources, soils, and ecosystems, represent additional losses to natural capital that remain unaccounted for, even though these critical stocks are finite, non-renewable, and vulnerable.[14] Furthermore, from the perspective of GDP accounting, fundamentally different activities—such as €100 spent on cleaning up an oil spill or €100 invested in public education or preventive healthcare—are treated as equal contributions to economic output. As a result, an economy can experience strong GDP growth while simultaneously running down the natural, social, and physical foundations that enable future value creation. Furthermore, GDP does not capture many important human activities that deliver functional and created value (such as informal activities, work at home, and subsistence farming that may be important for value creation in a circular economy). It also overlooks important socioeconomic outcomes such as inequality and poverty.

In a linear, take-make-waste economy, waste, resource depletion, pollution, and loss of natural capital register as zero in GDP, even though they directly undermine the foundations of future economic prosperity, well-being, and wealth. This perspective underscores a critical blind spot: nature is the foundation of the economy. Without a functioning biosphere, economic activity cannot exist.[15] Current material management practices are the main driver of pressures on planetary boundaries—including biodiversity loss, land and water pressures, and climate change—fundamentally eroding the very foundations of economic activity and human prosperity.[16]

Still, GDP remains the world's headline indicator of economic success, guiding mainstream political and economic decisions.[17] Despite widespread recognition of its limitations and its inability to capture sustainability, well-being, or the depletion of stocks, it remains the most widely available, standardised, and comparable measure of economic activity across countries and over time.[18] For practical reasons, this analysis therefore uses GDP as a proxy for overall value creation, not because it fully reflects societal value, but because it provides a common reference point against which value losses can be assessed. In particular, it enables the scale of the Value Gap to be understood relative to total economic output. While imperfect, GDP offers a useful benchmark; however, a more complete picture of economic activity requires examining not only value creation, but also the value that disappears in the process.

Value loss: How does value disappear?

Value loss refers to materials that no longer provide a useful function to society and/or impose harm on the environment and human well-being through negative externalities. In this sense, value loss reflects both foregone economic potential and additional costs due to environmental and social impacts or waste treatment.

Across the material economy, value loss follows one dominant pattern: the inefficient use of raw materials. From extraction through processing, use, and eventual disposal, value is continually lost. In strictly economic terms, this loss could stem from avoidable waste in production and consumption, premature product obsolescence, and the premature gradual deterioration of long-lived assets. More broadly, it can also manifest as environmental and social costs, including contributions to extreme weather events and the impacts of mismanaged waste, such as public health risks and significant economic losses, including damages to infrastructure and tourism.

These value losses can be grouped into five interlinked pathways, capturing both short-term inefficiencies in material flows and longer-term erosion of produced (depreciation) and natural (depletion) capital assets:

- **Processing losses:** Materials wasted during processing and manufacturing.
- **Energy losses:** Inefficiencies across the energy system, from extraction to end use.
- **Food losses and waste:** Food lost or wasted along supply chains, from gate to fork.[19]
- **End-of-life waste:** Residual value lost when products and assets reach the end of their service life.
- **Consumption of fixed capital:** The gradual deterioration of long-lived produced capital assets such as buildings, infrastructure, and machinery due to use, ageing, or damage.[20]

Together, the five value loss pathways capture the value loss embedded in linear economic practices. Viewed alongside GDP, they provide an informative, though still partial, picture of the *net* value created by today's economic activity, revealing how current output depends on the depletion of non-renewable natural capital and highlighting where circular strategies can improve value retention.

Understanding the relationship between value creation and value loss

The Value Gap and GDP both express value in monetary terms, but they reflect different perspectives on economic performance. GDP measures how much economic activity takes place within a given period. It tells us how much value is produced, but not how much value is *retained* or *eroded* in the process.

The Value Gap puts GDP into perspective by highlighting these limitations. Rather than measuring how much value is added today, it captures how much value is lost through structural inefficiencies and misaligned incentives embedded in linear systems. Importantly, the Value Gap is not a simple deduction from GDP, nor does it imply that all economic output is unsustainable. Instead, it provides a lens to assess the balance between value creation and value loss.

Seen this way, the Value Gap helps shift the conversation from economic volume to economic quality. A high Value Gap signals that a significant share of economic effort is dissipated rather than translated into lasting wealth, well-being or prosperity. Reducing the Value Gap, therefore, points directly to the opportunity space for circularity: redesigning systems so that value loss is minimised and more of the value created is preserved and carried forward over time, while reducing impacts on non-renewable natural capital.

Methodological considerations

While the Value Gap provides an estimate of value loss in the linear economy, particularly given that this is a first attempt at doing so, it comes with several limitations and caveats:

- **Partial scope:** The analysis focuses on the material economy: sectors that produce and maintain physical goods, including mining, agriculture, manufacturing, construction, and energy. Value losses related to the service economy (that is, financial services, insurance, and IT, among others) are excluded. However, the materials and physical assets that service industries depend on, such as buildings, electronics, and data centres, are captured. This means that while the value added by the service industry is considered in GDP, the 'linear share' of it is not considered in the value losses due to its intangible nature, but only the consumption of tangible fixed capital used by the service industry.
- **Partial internalisation of externalities:** Market prices do not fully reflect the social and environmental costs of economic activity. The current methodology quantifies functional value loss and partially internalises environmental and social impacts such as GHG emissions and open dumping (including uncollected and unaccounted waste). Yet it does not comprehensively monetise all environmental and social impacts, including acidification, human and ecosystem toxicity, eutrophication and resource depletion, nor broader societal disruptions, unquantifiable, catastrophic, or long-term impacts.
- **Current prices, sensitivity and assumptions:** To help ensure comparability across years and isolate the effect of inflation, constant rather than current prices for a fixed reference year should be used. Additionally, the results are sensitive to key modelling choices. This includes depreciation functions, initial capital stock estimates, avoidable loss shares and assumptions about the relationship between end-of-life stocks and retired assets when determining net current prices and residual value. Further validation and sensitivity analysis are needed to strengthen robustness.

For a more comprehensive list, refer to the Methodology Document.

3 The Value Gap

Measured in monetary terms, the Value Gap offers a framework for understanding inefficiencies in today's linear, take-make-waste economy. Quantifying these losses in monetary terms (in euros) helps not only to quantify the magnitude of wasted value but also to identify opportunities to enhance resource productivity, strengthen economic resilience, and support long-term sustainability.

The scale of these losses is striking. Globally, the initial estimate of the Value Gap is €25.4 trillion (± 4.7 trillion), compared to €82.6 trillion of gross domestic product. These figures highlight the enormous potential for avoidable value loss and recovery: reducing waste generation, improving resource efficiency, and extending asset lifetimes could unlock trillions of euros in value while also reducing environmental pressures and social costs.[21]

The following sections break down value loss into the five key pathways: processing losses, energy losses, food losses and waste, end-of-life waste, and consumption of fixed capital. Each pathway illustrates a different form through which value erodes, from immediate material losses in production and supply chains to the longer-term deterioration of infrastructure, machinery, and other material stocks of physical capital. Together, these pathways provide a comprehensive picture of where the economy loses value and, thus, where the greatest losses can be prevented.

*See Table 1 in the **Appendix** for a detailed breakdown of value loss estimates by pathway.*

The five pathways of value loss

Processing losses

€904.2 billion
(± €112.5 billion)

- ***Residual material/product value:***
  €481.5 billion
- ***Cost of treatment:***
  €233.1 billion (± €104.9 billion)
- ***Shadow cost:***
  €189.7 billion (± €7.6 billion)

Understanding processing losses

Processing losses reduce profitability and resource efficiency by wasting raw materials that already contain embedded energy, labour, and capital. They arise from process inefficiencies, defects, and reduced yield, wasting valuable materials before products reach the market.

How processing losses are calculated

In this analysis, processing losses are assessed across fourteen material categories, considering two main components:

1. **Recoverable material value:** The market value of recoverable material fractions lost during fabrication and manufacturing and not recycled.[22]
2. **Waste management costs:** The costs associated with handling and treating these materials, including the shadow cost of waste that remains unsorted.[23]

Why processing losses matter

Processing losses directly reduce profitability and resource efficiency by wasting raw materials that already embody energy, labour, and capital inputs. Reducing these losses lowers costs for materials, energy, and labour; cuts waste disposal expenses; and can improve brand reputation and competitiveness.[24]

In industrialised economies, material costs constitute the highest portion of the cost base of industrial companies. Across Europe, for example, material inputs account for about half of total industrial costs, with the automotive, chemicals, and base metals industries among the most resource-intensive.[25,26] Reducing losses in such sectors offers a significant opportunity to simultaneously strengthen industrial productivity and material circularity.

Energy losses

€8.7 trillion
(± €1.6 trillion)

- ***Residual material value:***
  €2.4 trillion (± €445.8 billion)
- ***Shadow cost:***
  €6.3 trillion (± €1.2 trillion)

Understanding energy losses

Energy losses occur throughout the energy system from extraction to end use. They represent the share of energy that is consumed or wasted without providing the intended service, such as useful heat or electricity. These losses arise from technical inefficiencies, heat dissipation, and system design limits across each stage of energy production, conversion, transport, and use.[27]

1. **Extraction:** During the extraction of non-renewable energy sources, such as coal, oil, or gas, losses occur through flaring and spilling.
2. **Conversion and transportation:** When primary energy is converted into usable forms like gasoline or electricity, additional losses arise from inefficient combustion in power plants, refining processes, and energy-intensive operations. Losses occur as heat dissipation in pipelines, electricity lost during transmission, leakage of gas and oil in pipelines, and fuel consumed by transport systems.
3. **End use:** At the point of consumption, energy is primarily lost through three main pathways. In buildings, losses occur through heating, lighting, and inefficient appliances. In transportation and mobility, vehicles (especially those with internal combustion engines) waste a significant share of the energy they consume. Large amounts of energy are lost as waste heat across a range of high-consumption sectors, from traditional industrial processes like metals production, cement, and chemicals, to modern digital infrastructure such as data centres.

How energy losses are calculated

Energy losses are expressed in monetary terms using market prices and shadow prices that incorporate the social cost of carbon to reflect the externalities of climate change on both human and ecosystem health. The range represents low and high estimates for rebound effects.

The majority of these losses are due to fossil fuel use,[28] with the largest occurring during end use:

1. **Primary energy extraction:** €1.1 trillion (± €164 billion)
2. **Conversion and transportation:** €2.3 trillion (± €441billion) for energy conversion and €315 billion (± €94 billion) for transportation
3. **End use (for buildings, transport and industry):** €4.9 trillion (± €916 billion)

Why energy losses matter

Most value is lost in the later stages of the energy chain, where energy exists in its most valuable and versatile form. However, preventing losses upstream during extraction and conversion creates additional value and reduces the total energy required to help meet global demand.

Food losses and waste

€650.7 billion
(± €28 billion)

- ***Food loss:***
  €594.6 billion
- ***Food waste:***
  €56.1 billion (± €28 billion)

Why food losses and waste matter

Food losses and waste translate directly into lost nutritional and economic value, as well as embedded resource waste, including land, water, and energy.[32] Preventing food loss can relieve pressure on ecosystems, enhance food security, and reduce emissions from agriculture and decomposition.[33] Reducing waste at both production and consumption stages is important to creating a food system that is both circular and sustainable.

Understanding food losses and waste

Food losses and waste refer to human-edible food that exits the supply chain and does not re-enter it in any usable form, such as animal feed or industrial inputs. Globally, about one-third of all food produced for human consumption (around 1.05 billion tonnes annually) is lost or wasted.[29]

- **Food losses** occur primarily in the early stages of the supply chain during production, processing, transport, and storage. These involve both edible and non-edible fractions and are largely the responsibility of producers, processors, and logistics providers.[30]
- **Food waste** arises at later stages (retail and final consumption) and includes only edible portions that could have been consumed. Retailers and consumers are the main actors influencing these losses.[31]

How food losses and waste are calculated

The economic value of food losses and waste is estimated by multiplying the quantities lost or wasted by representative regional food prices, excluding food loss at the production stage. This reflects the value of food effectively removed from potential use in the system, excluding the cost of treatment.

End-of-life waste

€10.0 trillion
(± €1.2 trillion)

- ***Residual material/product value:***
  €6.5 trillion
- ***Cost of treatment:***
  €2.4 trillion (± €1.1 trillion)
- ***Shadow cost:***
  €1 trillion (± €43.5 billion)

Understanding end-of-life losses

This is the residual product value (at the net recycled material value) of End-of-Life (EoL) waste from retired assets such as buildings, vehicles, and machinery, along with the costs of treatment and any associated externality costs. Over time, long-lived assets depreciate and wear, leaving only a fraction of their original value when retired or dismantled. Importantly, the product's functional value is not necessarily fully exhausted at this stage. Depending on the condition and remaining utility of components, significant value can still be preserved. While recycling retains only the underlying material value, strategies such as remanufacturing, repurposing, and reuse can maintain component-level or even full product-level value, making them higher-value recovery pathways than recycling alone.

How end-of-life losses are calculated

EoL losses are estimated by combining data on material stocks with their remaining market value at retirement, using Net Capital Stock data to derive a residual value per tonne of materials.[34] This remaining value is then combined with the cost of treating and processing these materials, following a similar approach used for processing losses. Critically, the difference in this case is that the recycled fraction of EoL waste is considered in the determination of the residual product value (as dismantled retired assets sent to recycling lose their component and product value) at the net of its material value (preserved through recycling, as with processing losses).

Why end-of-life losses matter

EoL losses mark the final stage of value erosion in the material economy. When assets are dismantled or discarded, most of the labour, energy, and functional value that went into producing and operating them is lost. Only a small share of the original value is recovered through recycling, since material recovery rarely compensates for the loss of component- or product-level functionality.[35] Extending the service life of long-lived assets through maintenance, renovation, reuse, or adaptive redesign offers one of the most effective ways to retain higher-level value and reduce waste in the global economy.

Consumption of fixed capital

€5.2 trillion

(± €1.7 trillion)

- ***Residual material/product value:*** €6.5 trillion
- ***Cost of treatment:*** €2.4 trillion (± €1.1 trillion)
- ***Shadow cost:*** €1 trillion (± €43.5 billion)

Understanding consumption of fixed capital

Consumption of fixed capital represents the decline in the current value of long-lived assets such as buildings, machinery, and infrastructure due to physical deterioration, normal obsolescence, or accidental damage.[36]

- **Physical deterioration** refers to wear and tear as assets are used over time.
- **Obsolescence** occurs when assets lose value because they no longer meet technological or economic requirements, or because superior alternatives become available.
- **Normal accidental damage** refers to incidents that occur during production, partially or completely impairing an asset, and sometimes leading to premature scrapping.

Together, these factors capture the gradual loss of productive value embedded in fixed assets across the economy.

How consumption of fixed capital is calculated

The value lost as fixed assets age or become obsolete is estimated by combining two main data sources, a macroeconomic database and a global multi-regional input-output table, to derive consumption of fixed capital value by asset type and sector for the year under analysis.

The portion of this loss that could be avoided through circular economy practices, such as maintenance, refurbishment, or extending asset life, is also estimated. The analysis assumes that 25–50% of depreciation could potentially be prevented, representing a large opportunity to retain value in the economy.

Why consumption of fixed capital matters

Depreciation has a direct impact on both economic performance and business resilience. As assets deteriorate or become obsolete, their ability to provide productive services declines, reducing efficiency, increasing maintenance costs, and undermining competitiveness.

Effective asset management can significantly slow this loss of value. Regular maintenance, upgrades, and refurbishment extend asset lifetimes and delay replacement cycles. Designing for durability and modularity allows equipment and infrastructure to remain functional and adaptable to changing needs, avoiding premature obsolescence. In a circular economy, managing depreciation is not merely an accounting exercise; it is a strategy for value retention, enabling longer use, reduced resource demand, and greater long-term sustainability.

Methodological considerations

System effects and limitations

- **General equilibrium effects and full transition costs are not modelled.** The analysis does not capture wider economy-wide interactions, such as price changes, rebound effects, or shifts in trade and employment, nor does it fully account for transitioning costs.
- **The results illustrate *indicative potential* rather than net-of-cost outcomes.** Findings show the potential scale of value that could be retained or recovered under a systemic circular economy approach, but do not deduct the investments or operational costs required to achieve these outcomes.
- **Where relevant, adoption of circular solutions is assumed to be gradual and path-dependent.** The transition to system-level circularity should be considered as a progressive process, shaped by existing infrastructure, technologies, and institutional conditions, rather than an immediate or uniform shift.
- **Results should be interpreted as 'up to' values, not guaranteed outcomes.** The estimates reflect technical or economic potential under favourable market conditions. Realising this potential could require investment and systemic change, and may involve short-term trade-offs, such as temporary reductions in measured economic output, sometimes referred to as a 'water-bed effect'.

Scope

- **Services are excluded from the value-loss calculations but are included in the measure of total value.** The Value Gap focuses on material and energy flows, and therefore excludes value losses associated with services. However, GDP includes both goods and services, meaning the measure of total value creation is broader than the scope of value loss assessed.
- **Focus on materials and energy as core inputs.** Factors of production included: Materials and energy are explicitly treated as direct inputs required to produce goods and deliver services. They serve as a key connective thread across the primary factors of production:
  - Land: natural resources
  - Labour: transformation of natural resources into physical assets
  - Capital: physical assets themselves
  - Entrepreneurship: the use and coordination of those assets

Value losses related to producing capital assets are included, but not those to natural capital (such as damages to ecosystem services) or labour (such as fair wages).

4 Understanding the Value Gap

Interpreting value loss: Pathways, mechanisms, and stages

The initial estimate of €25.4 trillion (± €4.7 trillion) in total value loss can be interpreted through three complementary lenses: value loss pathways, value loss mechanisms, and value chain stages (Figure two). First, value loss can be viewed as the aggregate of five pathways that structure losses along physical and monetary flows, as discussed in detail in The Value Gap.

Second, it can be understood through the mechanisms by which it occurs. That is, the underlying processes that drive inefficiencies and value destruction. Third, value loss can be examined from a value-chain stage perspective to show where, along the lifecycle of materials and products, value losses predominantly arise.

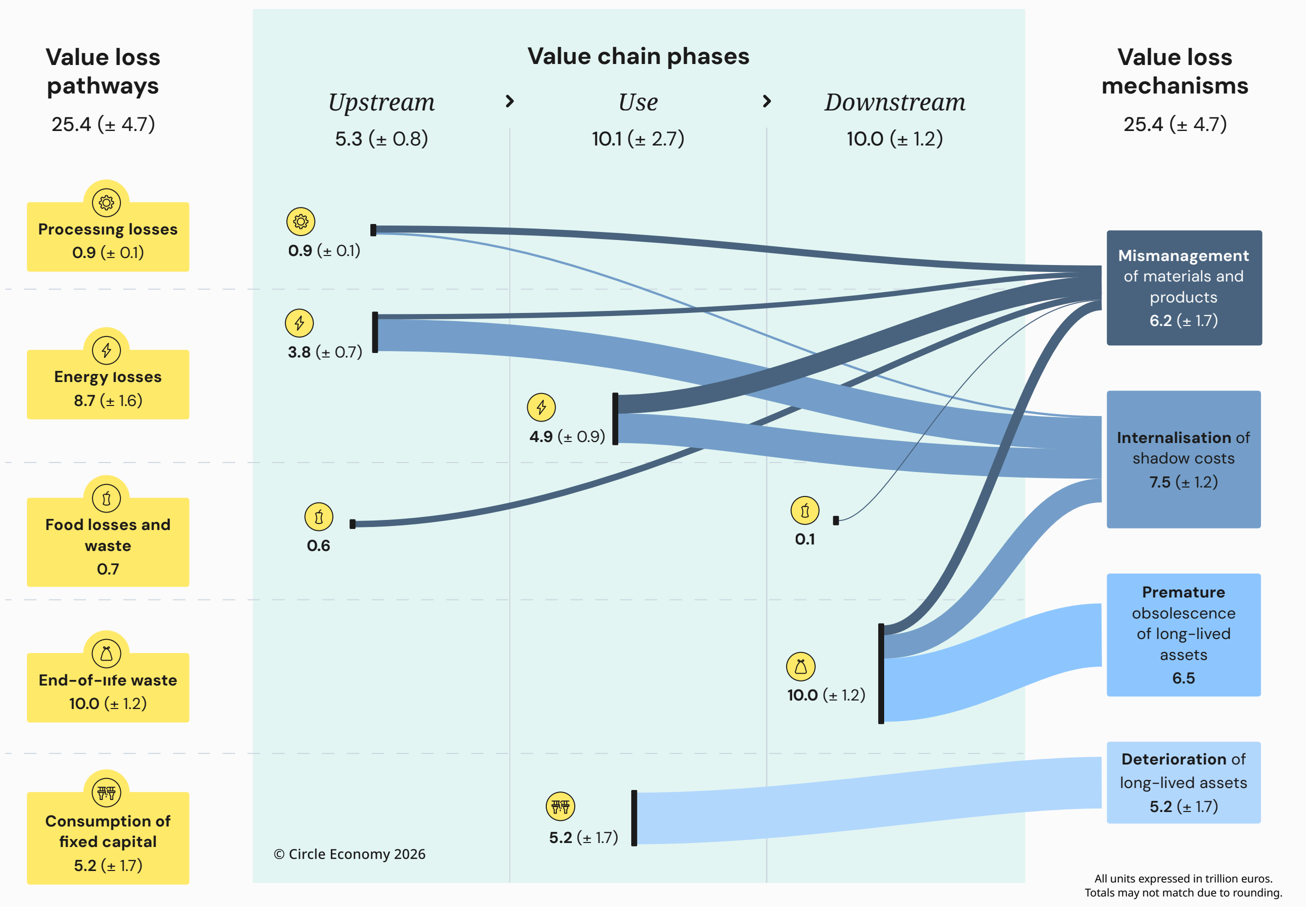

Figure two: Overview of value loss pathways and the mechanisms driving them across the value chain.
Source: [Circle Economy]

Why value loss occurs: From pathways to mechanisms

While pathways describe *how* value is lost in terms of physical and monetary flows, mechanisms explain why these losses occur. Pathways capture the manifestations of value loss—for example, through processing losses, food waste, energy losses, end-of-life waste, or asset retirement—whereas mechanisms focus on the underlying processes that generate these outcomes. These mechanisms reflect a complex interplay of physical, technological, behavioural, and regulatory factors and apply to materials embedded in both short-lived flows and long-lived stocks. In monetary terms, physical losses translate into foregone residual material or product value, collection and treatment costs, depreciation, and unpriced environmental and social costs.

Four main mechanisms explain how inefficient material use translates into value loss:

- **Mismanagement of products and materials** accounts for residual value lost due to inadequate technology, infrastructure, or operational practices across supply chains. This mechanism underpins processing losses, food losses and waste, and energy losses, as well as the associated collection and treatment costs.
- **Premature obsolescence** captures the loss of residual value when long-lived assets such as buildings, infrastructure and machinery are discarded earlier than technically necessary, driven largely by behavioural, regulatory or market dynamics rather than technological constraints.
- **Deterioration of long-lived assets**, reflected in the consumption of fixed capital, represents the avoidable loss of value as assets wear out or degrade over time, which is also largely driven by behavioural, regulatory or market dynamics rather than technological constraints.
- **Internalisation of environmental and social externalities** captures the shadow costs associated with pollution, emissions, and resource depletion that are not reflected in market prices. In other words, it involves pricing environmental and social impacts that would otherwise remain largely externalised. This mechanism applies across value loss pathways except for the consumption of fixed capital.

Viewed through this lens, mismanagement of products and materials accounts for €6.2 trillion (± €1.7 trillion), or about 24% of total value loss. Internalised shadow costs contribute €7.5 trillion (± €1.2 trillion), representing about 30% of total value losses. Premature obsolescence of long-lived assets accounts for €6.5 trillion (about 26% of total value loss), while deterioration of long-lived assets—equivalent to consumption of fixed capital—amounts to €5.2 trillion (± €1.7 trillion), about 20% of total value loss.

Where value loss occurs: Value-chain stages

Examining value loss from a value chain stage perspective reveals where losses are most concentrated.

- **Upstream**, €5.3 trillion (± €0.8 trillion) in value loss occurs, largely driven by energy losses and the internalisation of shadow costs linked to them, which account for €3.8 trillion (± €0.7 trillion) but also in the form of processing losses (€0.9 trillion, ± €0.1 trillion) and as food losses (€0.6 trillion).
- **During the use phase**, value loss totals €10.1 trillion (± €2.7 trillion), split roughly evenly between deterioration of long-lived assets through consumption of fixed capital (€5.2 trillion, ± €1.7 trillion) and energy losses (€4.9 trillion, ± €0.9 trillion), arising from both mismanagement and shadow costs.
- **Downstream**, value loss reaches €10.0 trillion (± €1.2 trillion), primarily due to end-of-life waste associated with the premature obsolescence of long-lived assets (€6.5 trillion), complemented by additional losses from mismanagement of products and materials (€2.4 trillion, ± €1.1 trillion) and shadow costs (€1.1 trillion, ± €43 billion).

Taken together, these results highlight that value losses are not driven by a single failure point, but by a combination of systemic inefficiencies in the use of materials, linear behavioural patterns, and unaccounted impacts embedded throughout the economy. Significant losses occur upstream through processing inefficiencies, not just in manufactured products but also food and technical energy carriers, and the associated environmental and social costs that remain largely externalised. During the use phase, value loss is driven primarily by the deterioration of long-lived assets and energy inefficiencies by industry and households, reflecting both technical wear and suboptimal usage patterns in material use. Downstream, premature obsolescence dominates, with products and assets being retired well before the end of their technical lifetime, leading to substantial losses of residual value. Across stages, the compounding magnitude of shadow costs highlights how conventional market signals continue to critically undervalue environmental and social impacts, fundamentally reinforcing linear practices.

These insights suggest that reducing value loss will require coordinated interventions that help address both physical inefficiencies (including technical aspects) and the economic incentives (including regulatory and price signals) shaping material use patterns, providing direction, which can help close the Value Gap.

Insights for future iterations of the *Circularity Gap Report: The Value Gap*

As this is the first edition of the global *CGR: The Value Gap*, the approach presented here should be viewed as a foundation for ongoing refinement and improvement. The Value Gap represents a first attempt to engage with the inherently complex question of how value is created, lost, and measured within today's economy. While it offers only a partial picture, it helps illuminate where linear practices erode value and where circular strategies have the potential to retain it more effectively. As such, it provides a foundation for further research into how value is defined and measured in ways that better reflect how circular resource use can contribute to increased productivity, resilience and long-term well-being.

Measuring the Value Gap will likely evolve as new data, tools, and research become available. This section highlights key insights and areas where further work could strengthen future iterations of the metric: improving its accuracy, expanding its scope, and enhancing its usefulness for policymakers, businesses, and a broader range of stakeholders across sectors.

1. **Refining and expanding the Value Gap to capture a fuller picture of value creation and loss.** Future iterations could reflect a broader scope of value creation, which recognises the economic significance of maintaining natural capital alongside physical capital. As statistical systems evolve, the metric can better integrate depletion-adjusted national accounts to help capture how the erosion of natural resources fundamentally undermines long-term well-being, prosperity, and economic productivity. For example, Net Domestic Product (NDP) would provide a more forward-looking basis for the Value Gap, as it already deducts physical capital depreciation and will soon include natural resource depletion.
2. **Expanding the framework to internalise environmental and social costs more comprehensively.** Future versions could incorporate a deeper internalisation of environmental costs, including impacts on ecosystem services, biodiversity, and land and water systems. At the same time, the framework could be expanded to better account for social dimensions of value loss, potentially through a 'Social Value Gap' component that captures social and decent-work deficits such as wages below living standards, health and safety risks, and the exclusion of informal workers from social protection. A metric analogous to the Social Cost of Carbon could help quantify these impacts, while recognising the often-unacknowledged contribution of informal labour to circular practices and value retention. Bringing these environmental and social layers into the metric would provide a more holistic understanding of how value is created, preserved, or lost across society.
3. **Broadening the definition of value beyond a conservative, monetary-focused baseline to better include sustainable well-being.** The first edition applies a deliberately conservative definition of value, reflecting resource and data limitations rather than conceptual preference. While this approach provides a comparable baseline, it captures only part of the value created or lost through material use. A circular economy ultimately aims to support human well-being, which cannot be fully assessed through monetary indicators alone. Future research could therefore complement monetary assessments of value loss with indicators that reflect broader well-being outcomes. These may include access to essential goods and services such as adequate housing, quality education, clean water, and nutritious food, as well as dimensions related to health, equity, and inclusiveness. Incorporating such elements would allow value creation to be evaluated not only in terms of economic and resource efficiency, but also in terms of how material systems contribute to meeting societal needs. Expanding the measurement framework in this way would strengthen the link between circular economy strategies and sustainable outcomes, which could offer a more complete picture of development, resilience and productivity.

Closing the Value Gap beyond resource efficiency

Inefficient material use in the global economy is not only a question of wasted materials, but also of how materials and value are distributed. The circular economy is often framed exclusively as a technical challenge: improving resource efficiency, maximising recycling, reducing waste, and strengthening competitiveness.[37] While these goals are important, they are not sufficient.[38] Closing the Value Gap is not only about *how efficiently resources are used and circulated, but also about what they are used for and whether they contribute to advancing societal well-being within planetary boundaries*.

Value creation is not purely quantitative. Producing and consuming more goods and services can increase economic output while delivering limited social benefit or even reinforcing inequality, overconsumption, and environmental harm. In this sense, value can be lost not only through wasted materials, but through misdirected resource use: when scarce resources are channelled into low-value or excessive consumption while essential needs elsewhere remain unmet.[39]

A circular economy that focuses solely on keeping materials in use risks reproducing these imbalances. To realise its full potential, circularity should also be guided by principles of sufficiency: reorienting from a primary focus on (re)cycling toward material demand reduction, lifetime extension, and higher value retention.[40] This requires shifting attention from volume and throughput towards possible outcomes: improved well-being, reduced inequality, and resilient socio-ecological systems.[41]

Ultimately, a value-centred circular economy depends on asking the right questions: *How do we measure value? What does the economy provide? For whom? And at what cost to the planet and society?*

Viewed in this way, the Value Gap shifts the focus from how much the economy produces to how well it converts economic activity into lasting value. A high Value Gap indicates that a large share of economic effort is lost rather than contributing to sustained well-being or long-term prosperity. Reducing the Value Gap, therefore, highlights a core opportunity for circularity: redesigning products, businesses and systems so that more of the value created is retained, more evenly shared, and carried forward over time.

5 Next Steps

The way forward for businesses, financiers, and policymakers

Achieving circularity at scale calls for coordinated action from businesses, financiers and policymakers to help drive systemic change. The Value Gap highlights where value is lost across the global economy, revealing the risks embedded in current linear practices.

Closing this gap will look to collective action to help address system-level challenges, dismantle linear lock-ins, and unlock transformational change.[42] Doing so is key not only to minimise value loss but also to help reduce economic risks, strengthen resilience, and build a circular economy that operates within planetary boundaries.

Business

Turning efficiency into opportunity

Businesses are practical enablers in translating circularity opportunities into real-world outcomes. By identifying inefficiencies in material use and innovating with new business models, organisations can preserve existing value and create new sources of value. Developing a robust business case for circularity is, therefore, an important first step. Such a case should be holistic: it should account not only for the value losses that stem from inefficient material use, but also for benefits such as enhanced supply-chain resilience, reduced vulnerability to fluctuating input costs, and stronger alignment with emerging regulatory and finance frameworks. Circular business models, ranging from lifetime extension and higher utilisation to the prioritisation of circular material inputs and technological innovations, offer concrete pathways to help reduce material throughput. Their success, however, could depend on business design choices, user behaviour, access to finance, and broader system conditions that often sit beyond the control of individual organisations.[43]

Key actions for businesses:

- **Build a holistic business case for circular value creation and preservation.** Organisations can begin by mapping material inefficiencies and value losses systematically across their value chains, from resource extraction and energy use to under-utilisation and end-of-life disposal. Quantifying these losses alongside the potential value of avoided waste, recovered materials, and extended asset lifetimes demonstrates the financial and strategic value of circularity. Importantly, this assessment can also capture less tangible but material benefits such as supply resilience and risk reduction that help strengthen the case for investment even where short-term returns are uncertain.[44]
- **Innovate and scale circular business model innovations.** Businesses can pilot innovative and sustainable circular business models such as product-as-a-service, material leasing, or take-back schemes to help minimise value loss and decouple value creation from material consumption. These models can open new revenue streams while reducing dependence on virgin inputs, but they often require enhanced capabilities, robust data, and stronger customer relationships. Assessing market readiness (financial, technological, and regulatory) can help organisations understand where pilots are viable today and where external conditions should evolve for wider adoption.[45]
- **Collaborate across value chains to help unlock value retention and creation at the system-level.** Many circular opportunities require collaboration beyond individual organisations and depend on coordination across suppliers, customers, and even peers. Vertical relationships can improve transparency and align incentives along the value chain, while horizontal collaboration—such as jointly organised collection, sorting, recycling, or reuse of residual materials—can enable economies of scale for circular solutions, reducing value loss and enhancing value retention. Establishing shared data standards and trusted supply relationships are significant steps to advancing resource efficiency, converting waste streams into reliable secondary inputs and mitigating the risks that currently deter investment.

Business models and projects should demonstrate clear value and robust business cases to enable investors and financiers to prioritise them. This is essential to unlocking investments. As businesses begin to identify and pursue circular opportunities, a new set of questions emerges that extends beyond the remit of individual organisations. Which opportunities are most likely to deliver durable value creation and material impact? How can execution, technology and commercial risks—often higher or less familiar than in linear models—be robustly assessed and appropriately priced? And which financial vehicles or mechanisms may be best suited to support these initiatives as they move from pilots to scale? Addressing these questions is crucial to unlocking investment and translating circular business ambitions into system-level change, thereby requiring businesses to proactively engage the financial sector to co-create new investment models and mitigate risk in circular innovation.

Finance

Reorienting capital flows for circular transformation

Addressing value loss at scale calls for financial systems to recognise, preserve, and enhance the long-term economic value of materials, products, and fixed assets. Current approaches to residual value, depreciation assumptions, and risk assessment often undervalue circular strategies that retain value over time, and underestimate the risks associated with resource use, thereby exacerbating systemic value loss. Closing the Value Gap calls for the financial system to adopt methods that better reflect the economic logic of value preservation, align capital flows with circular outcomes, and leverage financial sector regulation as a key enabler. Additionally, by fostering deeper sectoral expertise and innovation in investment structures, investors can unlock the full potential of the circular economy. Engaging with stakeholders to understand their needs, ambitions, risks, and capital requirements, and co-creating tailored solutions will likely be important to driving progress.

Key actions for the financial sector:

- **Integrate resource-use concerns into credit and investment decisions.** Lenders and financiers should look to better incorporate factors such as repairability, durability, and recoverability of products and materials into assessments of collateral strength, residual value, and long-term risk. Durable, recoverable, or retained-and-leased assets should be treated as economically stronger positions, rather than neutral or higher-risk deviations from standard models. By reflecting circular value retention in loan pricing, investment analysis, and collateral determinations, financial institutions can shift capital away from output maximisation and rapid asset turnover towards models that incentivise the preservation of material and economic value. Similar practices are already emerging in the climate domain: European lenders now differentiate mortgage pricing and collateral assessments based on building retrofit potential and energy performance, encouraging more sustainable investment decisions while managing risk.[46]
- **Assess exposure to resource-related risks in financial portfolios.** Supervisors and regulators should recognise that growing exposure to material scarcity, supply-chain disruption, and assets with shortening effective lifetimes represents a meaningful financial risk. Prudential authorities should require institutions to integrate these risks into core credit, portfolio and risk-management processes. Scenario analysis and stress tests can assess how disruptions in material supply, tightening product standards, or shifts in input prices can affect portfolio resilience. Doing so strengthens financial stability while incentivising organisations to improve efficiency, extend asset life, and recover more value. Supervisory experience in the climate space shows this is feasible: the European Central Bank now expects institutions to assess transition and physical risks through core processes, using scenario exercises to map how real-economy pressures propagate through balance sheets.[47]
- **Actively reorient capital flows towards more resource-efficient investments.** With robust risk assessment frameworks in place, supervisors can use regulatory measures to help steer capital toward more resource-efficient and resilient investments. For example, Pillar 2 capital adequacy requirements within the Basel framework can help ensure that institutions hold capital proportional to their exposure to resource-related risks, influencing how banks price, assess, and manage such assets across their portfolios and, fundamentally, the extent to which they can make a profit. Central banks can reinforce this by aligning collateral mechanisms with differentiated real-economy risk characteristics. Recent adjustments to the European Central Bank's collateral framework, where transition-related risks now influence eligibility criteria and haircuts, demonstrate that emerging real-economy risks can be credibly integrated into monetary operations in this way.[48]

Even where businesses innovate and finance is willing to engage, the scale and pace of the circular transition ultimately depend on the broader market conditions in which these actors operate. Persistent market failures, ranging from mispriced externalities and information asymmetries to fragmented standards and misaligned incentives, continue to constrain circular business models and investment. Policymakers therefore play an important role in shaping an enabling environment: helping to address structural barriers, align rules and incentives across value chains, and provide the long-term signals to reduce risk. By doing so, public action has the potential to help unlock system-level value retention and creation that neither businesses nor financiers can deliver on their own.

Policy

Creating an enabling environment

Closing the Value Gap could benefit from coherent, supportive policy frameworks that help address system-level challenges and linear lock-ins across fiscal rules, sectoral standards, international agreements, and behaviours. Helping to address market failures through consistent regulations and fair market conditions is important not only to help reduce value loss and waste but also to lower economic risks and unlock new value opportunities. With the right regulatory and market incentives, governments can help create the enabling conditions for circular, systemic solutions and drive structural reductions in value loss at scale. Together, the actions below could build a policy landscape that internalises shadow costs, strengthens the competitiveness of secondary materials, and systematically reduces avoidable value loss across the economy.

Key actions for policymakers:

- **Support target setting to optimise material use.** Resource extraction and consumption goals, as well as science-based targets, could guide businesses and societies in staying within planetary boundaries and encourage the prevention of value loss. Embedding resource governance and defined material-use pathways into sustainability strategies and environmental agreements, for example, could also allow countries' progress toward multilateral commitments (currently off track) to be measured and compared. Momentum is already building: 14 countries and regions have begun setting their own material use targets, demonstrating both the demand and need for stronger scientific guidance.[49] Science-based thresholds would help determine what level of resource use is 'sufficient' to address the triple planetary crisis, and could pave the way for environmental quota-based approaches—similar to fisheries management, emissions trading systems, or water abstraction—for high-impact sectors such as mining and forestry.[50]
- **Encourage the development of policies that better reflect externalities in market prices.** The lack of internalisation of negative externalities[51] is a major barrier to advancing circularity, keeping raw materials artificially cheap and disincentivising circularity and resource efficiency at the system level.[52] If left unaddressed, this misalignment can distort the business case for circular economy solutions, making it appear less attractive than it truly is. This generates the wrong set of incentives for determining how materials are used and distributed, structurally supporting linear production structures and consumption patterns that promote overuse, waste and value loss. Correcting distorted price signals is essential to tackling the systemic drivers of value loss and resource depletion. A practical next step could be to scale initiatives that aim to close the 'true price gap' by making shadow costs visible in economic decision-making. Many precedents already exist, especially in carbon pricing[53] and agricultural commodities.[54] Policymakers could accelerate progress by developing a coherent framework that makes sustainable circular practices the most profitable. This can be supported through gradually introducing regulations that require true-price disclosure and investing in standardisation and improved methodologies.[55]
- **Orient tax systems towards reducing value loss.** Tax incentives can be an effective lever to help drive behavioural change and support an inclusive circular economy that reduces value loss. Some policymakers are already applying this principle: for example, Canada offers tax credits for clean technology manufacturing,[56] and the EU enables Member States to apply reduced VAT for repair and circular services.[57] Taxes can also be designed specifically so that, if effective, they do not generate revenue. For instance, the UK's Plastic Packaging Tax,[58] imposes no additional charge when products meet minimum recycled content requirements, creating a clear economic incentive. These mechanisms can help realign market incentives with value preservation by encouraging circular economy practices across the entire value chain.

Closing the Value Gap requires coordinated action across business, finance and policy, grounded in a shared systems perspective. While individual actors each have distinct roles to play, lasting progress depends on addressing the underlying structural challenges that drive value loss across value chains, rather than treating symptoms in isolation. Creating an enabling environment for circular economy solutions involves aligning incentives, reducing risk, improving information flows, and correcting market failures that currently favour linear outcomes. By focusing collective efforts on these core barriers, stakeholders can unlock circular solutions at scale and shift the system towards value retention, resilience, and long-term prosperity.

Appendix: *Detailed analysis of the Value Gap*

Range	Low		Medium		High	
Unit	**Million €**	**%**	**Million €**	**%**	**Million €**	**%**
End-of-Life waste	7,769,127	9.41%	8,907,814	10.79%	10,046,501	12.17%
End-of-Life waste (Environmental Externalities)	1,037,273	1.26%	1,080,742	1.31%	1,124,212	1.36%
Processing losses	609,718	0.74%	714,540	0.87%	819,361	0.99%
Processing losses (Environmental Externalities)	182,089	0.22%	189,720	0.23%	197,351	0.24%
Food waste and losses	622,686	0.75%	650,729	0.79%	678,772	0.82%
Energy losses	1,979,196	2.40%	2,424,973	2.94%	2,870,751	3.48%
Energy losses (Environmental Externalities)	9.41%	9.41%		7.57%	7,419,317	8.99%
Consumption of fixed capital	9.41%	9.41%	9.41%	6.33%	6,963,530	8.43%
Total Value Gap as share of GDP		**25.15%**		**30.82%**		**36.48%**
Total Value Gap as share of NDP		**30.25%**		**37.07%**		

Table 1. Detailed breakdown of value losses per pathway per uncertainty range. The total Value Gap under the medium estimate (€25.4 trillion) represents 30.8% of GDP (€82.6 trillion) and 37.1% of NDP (€68.6 trillion).

Glossary

Circular economy is an economic model where the value of materials is maximised and maintained for as long as possible; the input of materials and their consumption is minimised; and the generation of waste is prevented and negative environmental impacts reduced throughout the life-cycle of materials. [Source]

Created value is the societal benefits generated through the transformation of resources and labour into goods and services, typically measured in monetary terms but also encompassing functional, social and environmental outcomes. [Source]

Consumption of fixed capital is understood as the decline, during the accounting period, in the current value of the stock of fixed assets owned and used by a producer because of physical deterioration (or wear and tear), normal obsolescence or normal accidental damage. [Source]

Depreciation is the economic proxy for the physical deterioration of assets in the economy (consumption of fixed capital). [Source]

Externalities are the positive or negative effects of economic activities that are not reflected in market prices and are borne by third parties or society at large, such as pollution, GHG emissions, or ecosystem degradation. [Source]

Functional value refers to the utility embedded in materials, components, and products (what they can do) captured through their market value and considered as the main determinant of economic value creation. [Source]

Greenhouse gases (GHGs) are a group of gases that contribute to global warming and climate change. The term covers seven GHGs divided into two categories. Converting them to carbon dioxide equivalents (CO_2e) using characterisation factors enables comparison and determination of their individual and total contributions to Global Warming Potential. [Source]

Gross Domestic Product (GDP) represents the total monetary value of all final goods and services produced within an economy over a specific period and is commonly used as a measure of economic activity. [Source]

Material footprint, also referred to as Raw Material Consumption, is the attribution of global material extraction to the domestic final demand of a country, referred to as a consumption-based approach. The material footprint equals the total volume of virgin materials embodied within the supply chain to meet final demand. At the global level, Raw Material Consumption is equivalent to material extraction. [Source]

Material throughput refers to the total flow of materials entering, circulating within and exiting an economic system over a given period, including extraction, processing, use and disposal. [Source]

Natural capital refers to the world's stock of natural resources and ecosystems (like air, water, soil, plants, animals) that provide essential benefits and services, such as clean water, food, climate regulation, and raw materials, supporting human well-being, economies, and future prosperity. [Source]

Net Domestic Product (NDP) is an economic indicator derived from GDP after subtracting the consumption of fixed capital, reflecting the net value created by an economy after accounting for asset depreciation. [Source]

Shadow costs are estimated monetary values assigned to externalities—such as environmental degradation or social harm—that are not priced by markets, used to reflect their true societal cost in economic analysis. [Own elaboration based on source]

Overconsumption refers to the expenditure on products and services that exceeds what is required to meet basic human needs, as defined by decent living standards. [Source]

Physical capital, also referred to as 'manufactured capital' in industrial ecology, refers to the tangible, man-made items like buildings, machinery, tools, and infrastructure used to produce goods and services, crucial for economic output but depreciating over time. [Source]

Planetary boundaries define the 'safe operating space' for humanity based on the planet's key biophysical processes. Originally developed by Rockström et al. (2009), and since updated by Richardson et al. (2023), the framework quantifies nine 'limits' for ensuring a stable and resilient Earth system. Six of nine boundaries have now been transgressed. [Source]

Premature obsolescence is the reduction of a product's useful life due to design choices, technological change or market practices that encourage early replacement rather than continued use, repair or upgrading. [Source]

Processing losses refer to losses of materials used for material purposes that occur during the fabrication of semi-finished products and the manufacturing of final products. Extraction and early processing waste are not included as they are assumed to be largely unrecoverable [Source]

Secondary materials are materials that have been previously used and have been recovered or prepared for reuse. This includes materials in products that have been reused, refurbished, or repaired; components that have been remanufactured; and materials that have been recycled (including downcycled). Synonym of "non-virgin materials". [Source]

Sufficiency refers to the policies and daily practices that avoid demand for energy, materials, land, and water while delivering human well-being within planetary boundaries. [Source]

The Value Gap is the total monetary value that is lost in the economy due to inefficiencies such as material waste, underutilisation, depreciation, and unpriced externalities. It represents the ratio between value loss and creation.

Value loss is the total monetary value lost, including unpriced environmental or social costs through processing losses, food losses and waste, energy losses, end-of-life waste, and consumption of fixed capital.

Value retention refers to strategies and outcomes that preserve or extend the economic, functional and environmental value of products, components and materials by keeping them in use at their highest possible utility for as long as possible. [Source]

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20. Depreciation is the economic proxy for the physical deterioration of assets in the economy (consumption of fixed capital).
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Lead authors (Circle Economy)

Álvaro Conde Soria, Alex Colloricchio

Contributing authors (Circle Economy)

Irlanda Mora Espinosa, Megan Murdie

Contributors (Circle Economy)

Andrew Keys, Shelby Kearns

Contributors (Deloitte)

David Rakowski, Partner and Circularity Lead, Deloitte UK

Dieuwertje Ewalts, Circularity Lead, Deloitte Netherlands

Cecilia Dall' Acqua, Sustainability Partner, Deloitte Spain

Michelle Varney, Sustainability Strategic Collaborations & Insights Leader, Deloitte Global

Charlotte Saussez, Sustainability & Circularity Consultant, Deloitte Spain

Frits Klaver, Director Strategic Impact Assessment, Deloitte Netherlands

Kotaro Uno, Senior Consultant at Sustainability Unit, Deloitte Japan

Sam Teague, Assistant Director, Deloitte UK

Expert panel members (External)

HH Dr Adham bin Turki Al Said, Assistant Professor of Economics at the College of Economics and Political Science in Sultan Qaboos University

Delphine Garin, Manager, Circular Finance and Data, WBCSD

Dr Diane Zandee, Ass. Professor of Sustainability & Finance, Nyenrode Business University, Coalition Circular Accounting Swapfiets

Erik Bronsvoort, Freelance Project Manager

Guy de Sévaux, Senior Advisor Circular Economy, Invest-NL

Ilaha Abasli, PhD researcher, International Institute of Social Studies (Erasmus University Rotterdam)

Dr Lis J Suarez-Visbal, Senior Researcher, Accelerate Circular Transition Project & Deep Transitions Lab, Centre for Global Challenges (Socio-Economic History Department) & Copernicus Institute of Sustainable Development, Utrecht University

Naomi Kamer, Circular Economy Policy Advisor at Province Utrecht

Dr Nancy Bocken, Professor in Sustainable Business & Circular Economy, Maastricht University, Maastricht Sustainability Institute

Niina Pussinen, Lead Circular Economy & Biodiversity, ABN AMRO

Paul Schenderling, Director, Postgrowth Netherlands

Rob Buurman, Director, Fair Resource Foundation

Communications (Circle Economy)

Luba Glazunova

Design (Circle Economy)

James Aung, Alexandru Grigoras

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