wbcsd

# CIRCULAR TRANSITION INDICATORS V1.0

## Metrics for business, by business

Powered by KPMG

# Contents

# Join us in measuring circular performance!

## Developed by:

AkzoNobel, Aptar, ArcelorMittal, CRH, DSM, Dow, GREIF, iff, KPMG, LafargeHolcim, Michelin, Microsoft, Novartis, Philips, pwc, Rabobank, sabic, SCG, Shell, Sims Metal Management, Solvay, Storaenso, Suez, Veolia, Whirlpool

## In alignment with:

CIRAIG, Circle Economy, Cradle to Cradle Products Innovation Institute, Ellen MacArthur Foundation, GRI, MVO Nederland, PACE, Sitra

## Supported, used and tested by:

CIRCULAR IQ, NS, ptt

The Circular Transition Indicators framework was developed by the Circular Metrics working group as a part of Factor10, the flagship project of WBCSD's Circular Economy Program.

As a partner with WBCSD and the other member companies who are part of this critical commitment, it is important that we deliver our vison for a more circular economy while also creating top quality products. The Circular Transition Indicators project is key as it allows us to self-assess, to further define circular performance and also to prioritize and establish targets to monitor our progress.

**Stephan Tanda**
President and CEO, Aptar

The research is clear. A future based off a take-make-waste economy is simply not viable. Companies that adopt the CTI guidelines and baseline their circularity are taking an uncommon step towards actively creating a more sustainable future for people and planet.

**Andreas Fibig**
Chairman and CEO, IFF

We are proud to be part of WBCSD's joint initiative to create the CTI, a common framework for business to measure its circular performance. We believe this is a critical step to accelerating the transition to a circular economy, and enabling companies to unlock the trillion-dollar opportunity that a circular world can bring.

**Gary Reader**
Global Head of Clients & Markets, KPMG International

The WBCSD Circular Transition Indicator is an excellent tool for businesses to become more circular by reducing the use of virgin raw materials and fossil fuel energy based on company data. This is essential for creating the new economy.

**Maria van der Heijden**
Director, MVO Nederland

Today marks an important milestone for businesses of all sizes that manage material flows and want to accelerate their circularity performance. The measurement tool launched by WBCSD today, is bringing together intelligence from circular leaders to help us measure and compare circularity efforts at company level in a unified way. A great achievement and very welcome initiative to ensure we meet future demand within the planetary boundary conditions.

**Frans van Houten**
CEO, Philips

To ensure that we have sufficient food and other necessary goods in 2050, our economy has to become circular. This does not only require fewer raw materials, but also contributes to reducing carbon emissions. For this purpose, it is essential to gain insight in the sourcing and flow of materials. The Circular transition indicators (CTI) act as a driver for this. What gets measured, can be improved! And especially if we work together.

**Wiebe Draijer**
CEO, Rabobank Group

Transitioning to a circular economy is about much more than just reducing the waste inherent in the linear economy. It's about sustainable growth that creates economic opportunities, environmental and social benefits and increases business resilience. This transition requires a systemic shift that closes, optimises and values resource loops across the value chain which makes collaboration across companies pivotal.

**Alistair Field**
CEO, Sims

# Foreword

**Resilience is the ability to adjust easily to change, or the ability to adapt.**

For over 250 years, we have become increasingly entrenched in an economic system that rewards large-scale manufacturing, limitless consumption and short consumption cycles without consideration of the environmental and social consequences. Today, we find ourselves at a breaking point of the pressure that our current linear economic model inflicts on the planet, its resources and society.

The urgency of moving towards a circular economy has never been more clear. It is estimated that the 'circularity gap' has widened from two years ago from 9.1% to 8.6%; in other words, only 8.6% of minerals, fossil fuels, metals and biomass that enter the economy are re-used annually. The businesses and governments that embrace a circular mindset and embed it within their strategies and decision-making will become more resilient. Those that wait too long, risk becoming obsolete in tomorrow's economy.

We, at Royal DSM, have been successful for over 100 years because reinvention and transformation is in our blood.

Starting out as a coal mining company in 1902, DSM has recreated itself time and time again to respond to new market opportunities and risks. Today, DSM offers solutions in Nutrition and Sustainable Living. We use science and innovation to address the greatest challenges faced by society, including resource scarcity and the opportunities arising from the circular economy.

As resources and circularity is one of our key priorities, we volunteered to chair WBCSD's Factor10 - Circular Metrics workstream to develop the Circular Transition Indicators (CTI) with 25 other companies. The CTI is an objective and quantitative framework for companies of any industry, value chain position and size to consistently measure their circularity and understand the associated risks and opportunities to the business. Through this framework, companies can understand their progress in moving towards circularity, monitor this over time, and use it to inform key decisions and advise key stakeholders.

The circular economy requires collaboration across value chains, industries and sectors. To ensure we're making progress in our circular aspirations, it's essential to speak the same language.

This allows us to collect the right information from each partner and co-adapt to a circular economy. The intention is to provide companies with insights into their status as they adopt circular business practices and ultimately seize circular business opportunities and address current and future linear risks facing the business.

We call on businesses of all sizes to use the CTI and the free online tool to establish a baseline. Start with a product, business unit or the whole company, it's up to you. In addition to demonstrating a true and ambitious commitment to the circular economy, you'll be better positioned to respond to internal and external stakeholder questions when they arise.

This is the beginning of your company's adaptation towards greater resilience. We hope to see you in another 100 years in the global circular economy.

**Feike Sijbesma**
CEO, ROYAL DSM

CIRAIG salutes WBCSD's leadership in the development of Circularity Transition Indicators anchored in robust science. We are proud to have contributed to this consensus building effort bringing together key stakeholders of the sustainable innovation ecosystem from both the private and public sectors as well as academia and NGOs. We are confident it will pave the way to action towards a sustainable and circular transition.

**Sophie Fallaha**
Executive Director, CIRAIG

The CTI is a welcomed effort in circular economy, providing a flexible tool for companies to deepen their understanding on circular material flows. I am glad that the Ellen MacArthur Foundation has been part of the CTI Advisory Group to ensure alignment on how we define and measure material flows, and look forward to seeing the adoption of measurement to guide the transition to a circular economy.

**Andrew Morlet**
Chief Executive, Ellen MacArthur Foundation

To protect global environmental commons, we need to quickly move on to a circular economy model and business is at the heart of leading the transition. They are seeking – but not always finding – ways to measure progress and improve their operations. This WBCSD online tool fulfills this need by enabling business leaders to self-assess their operations, examine alternative scenarios for improvement and ultimately adopt and report more sustainable, circular practices.

**Naoko Ishii**
CEO and Chairperson, Global Environment Facility (GEF)

I welcome the publication of WBCSD's Circular Transition Indicators. GRI contributed to the development of this project, helping align the content with our upcoming update to GRI's Waste Standard, which places circular thinking at the heart of waste reporting. GRI is proud to support this effort, as a part of our ongoing work with WBCSD over many years on unifying approaches for disclosing critical sustainability performance information.

**Tim Mohin**
Chief Executive, Global Reporting Initiative (GRI)

Leaders need stronger data to better understand the opportunities and risks in the transition to circular business models and an overall economy running on circular principles. The CTI approach from WBCSD and its members is a great start to helping companies better understand their material use, risk exposure, and investments opportunities. This work and the data that will result will enable us to better understand the practical way forward for transitioning existing companies to circular models, and identify critical common issues that require collective action to unlock the full potential of circularity.

**David B. McGinty**
Global Director, PACE

Circular economy innovations, investments and policies shape businesses and societies at a growing speed in the 2020s. Companies and societies that want to remain competitive will innovate and scale up climate-neutral circular business models and ensure that the transition to a circular economy is as just as possible. We welcome WBCSD's CTI as an important tool to guide companies' decision-making when advancing circularity in their strategies and operations.

**Mari Pantsar**
Director, SITRA

Business leaders know that if it can't be measured it won't be managed. The members of WBCSD therefore deserve great credit for coming together to develop and implement this transparent approach to measuring circularity. Achieving sustainability is an ongoing journey that needs leadership from all sectors. WBCSD's Circular Transition Indicators represents the business sector taking a leadership role. I look forward to continued collaboration across all sectors as we accelerate bringing circularity into the mainstream.

**Dr. Andrew Steer**
President and CEO, World Resources Institute (WRI)

# Executive summary

**As the circular economy grows in momentum, it is imperative for companies to prepare for their transition based on insights into their circular performance and associated risks and opportunities. To do this, business needs a universal and consistent way to measure its circularity.**

According to the Circularity Gap Report, the global economy is only 9% circular today.[1] The Circular Transition Indicators (CTI) shaped by 26 WBCSD member companies help answer questions like:

- How circular is my company?
- How do we set targets for improvement?
- And how do we monitor improvements resulting from our circular activities?

The CTI is simple, applicable across industries and value chains, comprehensive yet flexible, complementary to a company's existing sustainability efforts and agnostic as to material, sector or technology.

Central to the CTI stands a self-assessment that determines a company's circular performance. It focusses primarily on the circular and linear mass that flows through the company, in which design, procurement and recovery models are crucial levers to determine how well a company performs. In addition to the ability to close the loop, the CTI provides insights into overall resource use optimization and the link between the company's circular material flows and its business performance. The framework does not evaluate the environmental and social impacts of the company's circular activities. However, understanding mass flows is a major step in knowing their impacts.

Although the use of common indicators for circularity performance is essential to accelerating the transition to the circular economy, the value of the CTI for a company goes beyond the calculation in the guidance, analysis and explanation for how circularity drives company performance. The CTI process helps companies to scope and prepare the assessment and interpret its results, understand its risks and opportunities, prioritize actions and establish SMART targets to monitor progress.

The CTI is inward-facing, objective, quantitative and based on demonstrable data. This data may sit in hidden corners of the company or even outside the company, with its value chain partners. In order to support and guide companies through this process, we have partnered with Circular IQ to develop the CTI online tool available at www.ctitool.com.

Through the tool, the CTI initiates value chain discussions, which are essential to accelerating the transition to the circular economy.

As customer, investor and regulatory pressures to demonstrate circular performance increase, it is in each company's best interest to respond credibly. The CTI delivers a framework to prepare this response. It does not provide a rating but leaves it to the company to determine whether the results are in accordance with its ambitions, putting the company in the driver's seat of its own circular transition.

We invite companies of all sizes and industries worldwide to demonstrate their commitment to the circular economy by measuring their circular baseline guided by the CTI and supported by its online tool.

Part 1.

# Circular Transition Indicators: Framework

# Circular Transition Indicators

**Today the world is 9% circular. Not only is it clear that this is not sustainable, the urgency to step away from a take-make-waste economic model is growing. If this wasteful trend continues, we will require more than 1.7 planets to meet the world's natural resource needs by 2030,[2] making achieving the Sustainable Development Goals (SDGs) and Paris Agreement virtually impossible.[3]**

**Where some see waste, we see value, opportunity and a business case to use resources for as long as they can last.**

As the pressure to shift from linear to more circular ways of doing business increases, the good news is that the opportunity to improve stands at 91%. The momentum to transition is growing and both the private and public sector are beginning to set ambitious circular targets. For example, the European Commission is promoting an accelerated transition and the Netherlands introduced a government-wide program to reduce primary raw material use by 50% by 2030 and transition to a full circular economy by 2050.[4] Transparency and alignment are critical to establishing a common language across industries and governments to develop strategies and measure progress.

For this reason, 26 global companies have come together through WBCSD's Factor10 project to develop Circular Transition Indicators (CTI). Our aim was to develop an objective, quantitative and flexible framework, identifying risks and opportunities to determine circular priorities and set targets. We do not intend for this framework to replace existing sustainability frameworks already used by industry; rather, we endeavor to provide additional insights into circularity performance.

This CTI framework is based on an assessment of material flows within company boundaries, combined with additional indicators on resource efficiency and efficacy, as well as the value added by circular business. Through this lens, the framework can guide companies in gaining concrete insights into how they can most effectively transition to a circular economy and the associated opportunities.

# The need for circular metrics

**Linear business models may be profitable in the short run, but over time, they will expose companies to market, operational, legal and business risks.[5] At the heart of the business case for circularity sits the opportunity for companies to create more value by being smarter about how they use resources. Through circular business models, companies can accelerate growth, enhance competitiveness and mitigate risk.[6]**

## TRANSITION

While a circular economy is an economic model that provides opportunities for companies across industries, the transition to a circular economy is not straightforward. Companies must change business models, adapt strategies and evolve the skills of their workforces, and governments must adjust policies to enable the circular economy. This makes it difficult to plan for and set clear targets for a coordinated transformation. To understand where a company currently stands in its circularity and allow for the setting of targets monitored by clear key performance indicators (KPIs), companies need a system of metrics that can guide their decision-making when adopting circularity in their corporate strategy.

## ONE COMMON APPROACH

No company can drive the transition to a circular economy on its own. The circular economy requires a larger industry and value chain effort. To transform, companies must speak the same language, regardless of size, sector or value chain position. Having a common approach to measuring and monitoring circularity performance is essential. This will allow value chains to become value cycles, working to achieve a shared vision.

This initiative started as the Circular Metrics Landscape Analysis,[7] in which we carefully studied and reviewed existing protocols and standards for circular metrics. The analysis and subsequent conversation identified several ways to calculate circularity, such as the Material Circularity Indicator by the Ellen Macarthur Foundation and Granta Design for quantitative circularity self-assessments at a product level;[8] the Circle Scan by Circle Economy[9] or the Circularity Check by Ecopreneur[10] for a qualitative circularity self-assessment; and Circulytics by the Ellen Macarthur Foundation for a quantitative and qualitative third-party assessment.[11]

The analysis concluded that there was an existing need for an inward facing, quantitative approach and guidance to measure circularity on a company level in a framework that complements assessments and tools used by companies today.[12]

### Circular economy definition

The circular economy is an economic model that is regenerative by design.

The goal is to retain the value of the circulating resources, products, parts and materials by creating a system with innovative business models that allow for long life, optimal (re)use, renewability, refurbishment, remanufacturing and recycling. By applying these principles, organizations can collaborate to design out waste, increase resource productivity and maintain resource use within planetary boundaries.

**NOTE**

The CTI is in alignment with the Ellen MacArthur Foundation circular economy principles:

- Design out waste and pollution
- Keep products and materials in use
- Regenerate natural systems.

# Use of the CTI

The CTI offers companies insights into their circular economy performance, allowing them to:

- **Identify circular opportunities and linear risks**, with the aim of improving company longevity and resilience
- **Set a baseline and monitor progress** on their circular transition
- **Respond to customer and investor inquiries**
- **Start value chain conversations** on shared circular priorities
- **Attract new business** by simultaneously advancing customers' circular objectives.

With the CTI, we aim to empower companies in their circular transition by allowing them to better understand their circular economy potential. As such, we endeavor to be as non-prescriptive as possible.

WBCSD does not play a role in a company's CTI assessment, which was developed as an inward-facing tool for companies to gain insights into their circularity. As such, it does not:

- **Determine full sustainability performance.** The CTI measures the circular and linear mass flows through a company and evaluates its effectiveness in using resources. With these insights, it complements existing and commonly used sustainability frameworks that cover a company's wider sustainability impact (e.g., GHG emissions, biodiversity, human capital, etc.). Circularity in itself is not the only goal.
  This framework does not evaluate the environmental and social impacts of the company's circular activities. However, understanding the mass flows is a major step in knowing their impacts.
- **Compare industries, companies or products.** Each company's circularity journey is unique. It is therefore only possible to make comparisons in a relevant context and upon careful consideration.
- **Target non-sustainability marketing and promotional materials.** Circular economy is an important and necessary pathway to more sustainable production and consumption. However, its influence on a company's sustainability performance depends on the larger context of other sustainability indicators. Companies are discouraged from communicating the results of the framework externally unless they present them in the appropriate context.

We consider the following to be an appropriate context:

- The company also shares all framework indicators to give the reader a comprehensive view of the company's circularity performance;
- The company clearly states that the "Circular Transition Indicators are not a sustainability assessment and that results should not be used to compare companies or industries"; and
- An independent third party assures the results.

**EXAMPLE**
**Shared priorities**

One of the key drivers behind the aluminum industry's highly effective recycling infrastructure was a coalition of aluminum value chain stakeholders that realized the material was at risk of both depletion and reduced competitiveness if linear consumption rates continued their trajectory. Their combined commitment and resources to develop a powerful recycling infrastructure lay at the core of today's 70% recovery rate for aluminum cans.

In 2015, the Aluminium Stewardship Initiative (ASI) was incorporated, with a multi-stakeholder governance model, to develop and operate an independent third party certification program which continues to drive a material stewardship approach for aluminium throughout the value chain.[13]

## THE CTI ONLINE TOOL

Data is a crucial ingredient in the CTI. This includes data that may be readily available, as well as data hidden in pockets of the company or even data that exists outside your company with supply chain partners. Obtaining this data and performing the calculations constitute the most resource-intensive parts of the framework. To optimize CTI accessibility and usability, we have partnered with Circular IQ to develop the CTI online tool: www.ctitool.com.

This tool structures data and calculates the outcome. It includes functionality that can support users as they reach out to internal stakeholders or value chain partners for data requests so as to avoid confidentiality issues. Additionally, it documents the exact scope and steps taken, allowing for consistency and monitoring over subsequent cycles.

The tool will be continuously improved for user experience and actionable and meaningful outcomes.

## REFERENCE BASELINE

As the CTI online tool compiles aggregated and anonymized data, it will be able to provide companies with tailored feedback on performance levels against industry, regional and value chain position baselines.

### Framework principles

**Simplicity**
Be as simple as possible within the context of the circular economy.

**Consistency**
Use one common, cross-industry language and provide consistent insights into circular opportunities and linear risks regardless of organization size, sector or value chain position.

**Completeness and flexibility**
Offer a complete set of metrics with the flexibility of accommodating for diverse business needs.

**Complementary**
Given that circularity is one pathway to more sustainable production and consumption, assessments should never take place in isolation and should always complement other existing sustainability and business metrics.

**Neutrality**
Refrain from prioritizing specific materials over one another insofar as they all contribute to the circular economy.

# A value chain effort

The circular economy requires collaboration. The entire value chain must work together to maximize the value created for every unit of resource.

Figure 1 illustrates a simplified value chain. The further a company is from the red arrows, the more difficult it can be to obtain information.

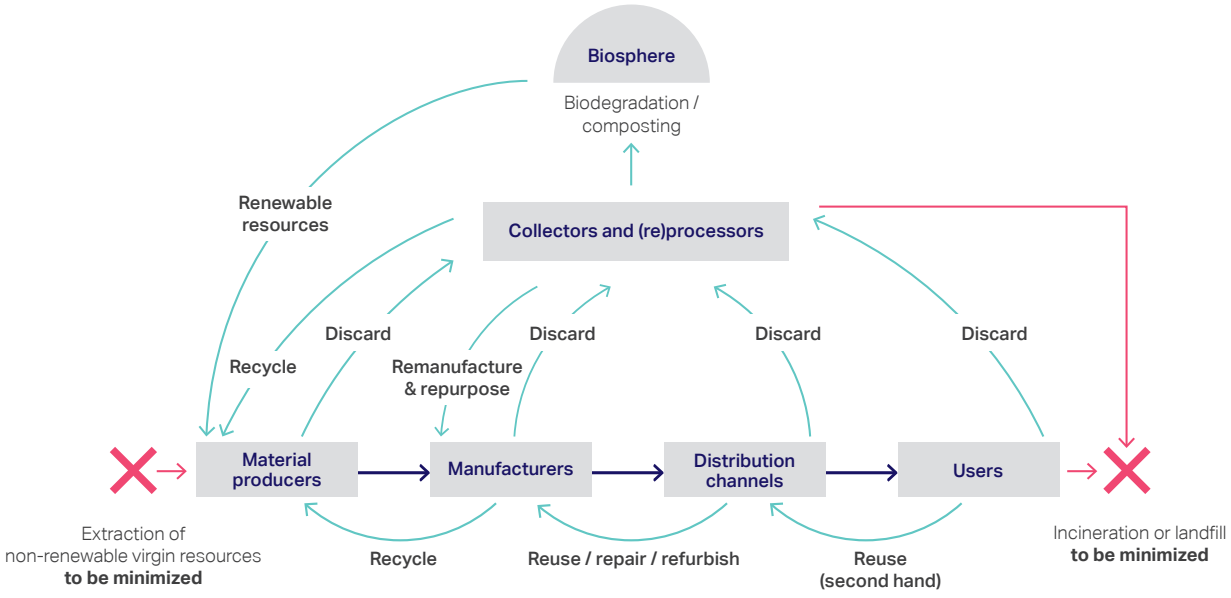
The CTI is a catalyst in the initiation of cross value chain conversations. It provides a process for value chain partners to collectively pursue shared goals.

The CTI online tool helps companies obtain required data from value chain partners without raising privacy or confidentiality concerns.

**EXAMPLE**
**Shared priorities**

A Dutch telecom company engages with their supplier through a Circularity Manifesto, ensuring their upstream value chain partners conduct their business in the same circular way the telecom company does.[14]

**Figure 1:** Simplified representation of the value chain recovery system



# The CTI methodology logic

The CTI is based on material flows through the company.* By analyzing these flows, the company determines its ability and ambition to minimize resource extraction and waste material.

It entails the assessment of the flows within the company's boundaries at three key intervention points:

### Inflow
How circular are the materials the company sources?

### Outflow – recovery potential
How does the company design and process its materials to ensure they can be technically recovered (e.g., by designing for disassembly, repairability, recyclability, etc.)?

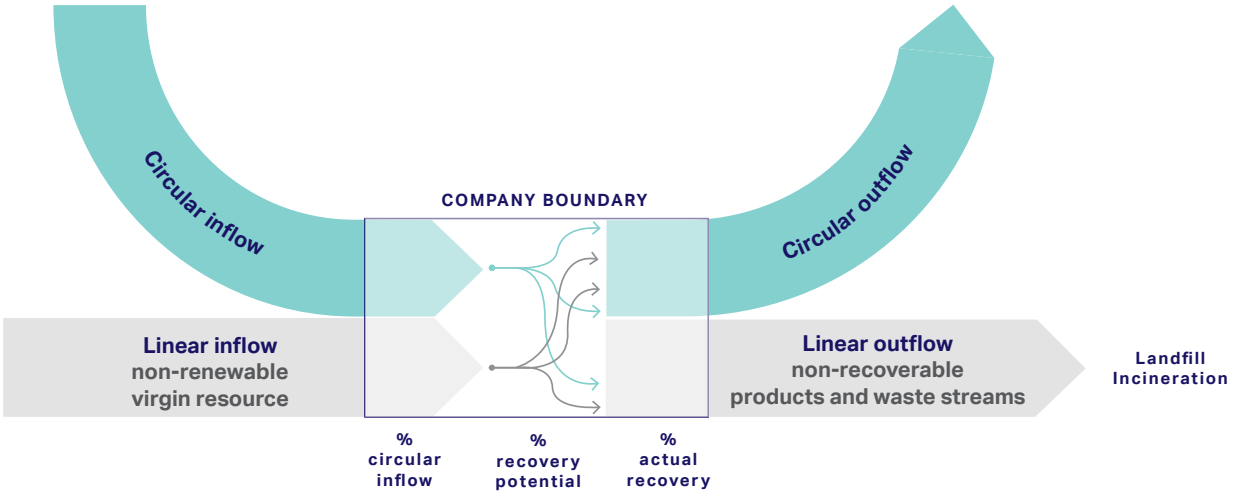
### Outflow – actual recovery
How much of the company's outflow is actually recovered?** This outflow includes products, by-products and waste. Actual recovery rates can be improved through new business models or mandatory or voluntary recovery schemes.

The results of this analysis will illustrate how effectively a company closes the loop on its material flows.

***NOTE**
**Material flows**
Material flows can include nutrients, compounds, materials, parts, components or even products. For readability, this report refers to all of these as material flows.

****NOTE**
**Recovery**
Recovered refers to the technically feasible and economically viable recovery of nutrients, compounds, materials, parts, components or even products (depending on the organization) at the same level of functional equivalence through reuse, repair, refurbishment, repurposing, remanufacturing, recycling, composting or biodegrading.

**Figure 2:** Illustration of material flows



# The indicators

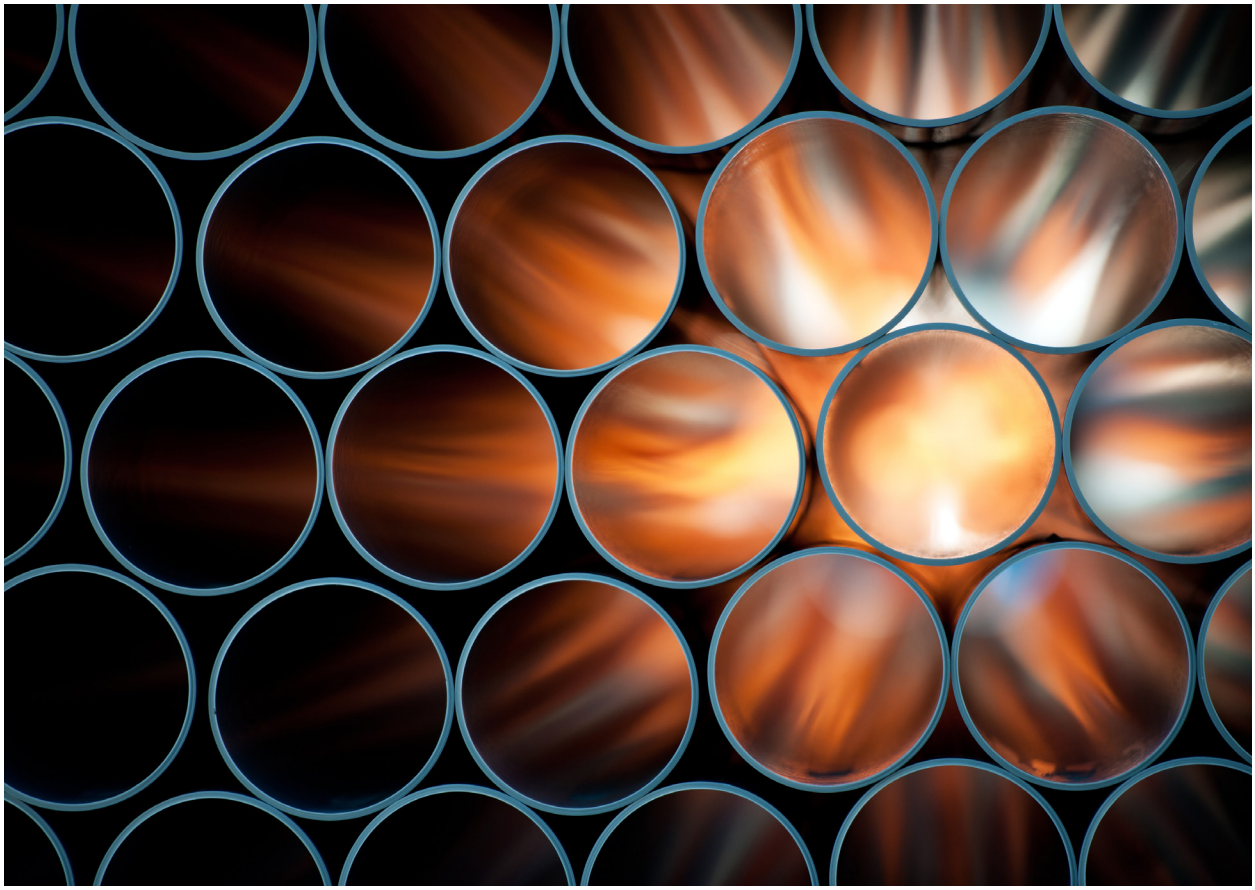
Any company, regardless of size, sector or position in the value chain, can use this framework. As such, the selection of indicators relevant for any particular business will vary. The CTI provides a menu of indicators, some of which are optional.

Assessments start with the completion of the full **Close the loop** module. Companies may then calculate indicators from **Optimize the loop** and **Value the loop** for additional insights.

**Close the loop**
% circular inflow
% circular outflow
% water circularity
% renewable energy

**Optimize the loop**
% critical material
% recovery type

**Value the loop**
Circular material productivity



## 1. CLOSE THE LOOP

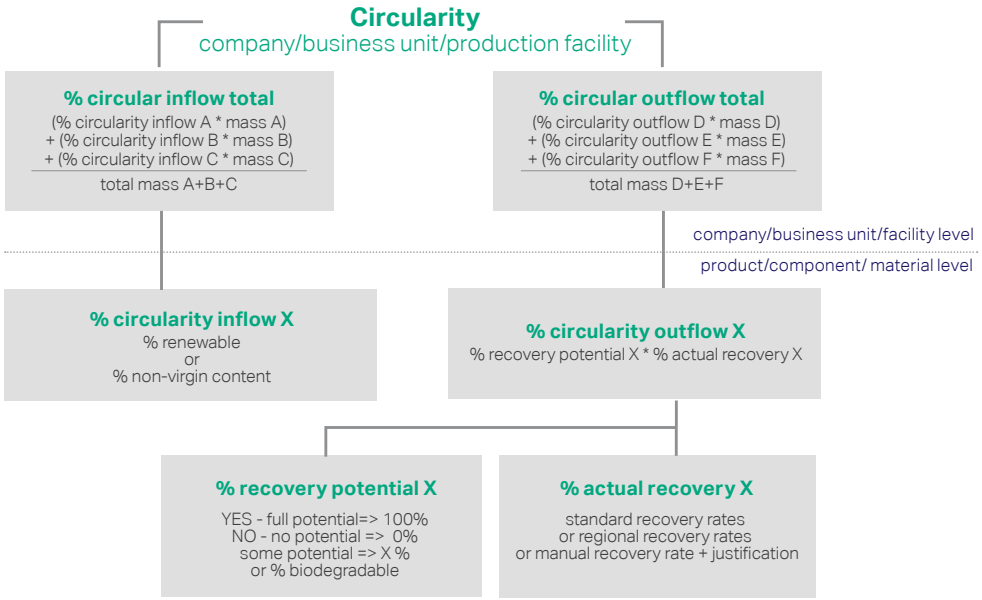
**This module calculates the company's effectiveness in closing the loop on its material flows.**

This can be assessed on the level of the company, a business unit or (production) site location.

### Circularity performance based on materials flows

A company's circularity performance is the average between % circular inflow and % circular outflow, as outlined in the formula structure below.

**Figure 3:** Formula structure




### Water circularity

In addition to material flows, we consider the circularity of freshwater to be an important element of the circular economy. **Water circularity** characteristics beyond flow quantity are quality and regional water stress levels. We are planning a development initiative in collaboration with the WBCSD's Global Water Solutions Project to develop further indicators for water circularity. The aim for completion and integration into the CTI framework is January 2021.

**% water circularity**

formula to be confirmed

### Renewable energy

The circular economy requires the transition to renewable energy. As most companies already have metrics in place to measure renewable energy consumption for business operations, the CTI considers energy separately for which companies can use this existing data.

**% renewable energy**

$$\frac{\text{renewable energy (annual consumption)}}{\text{total energy (annual consumption)}} \times 100\%$$

**NOTE | More information**

For more detailed and specific information on the indicators, see the user manual on page 23.

**NOTE | Working group for metrics for water circularity**

WBCSD Factor10 Circular Metrics working group and WBCSD's Global Water Solutions Project are joining forces and expertise to develop a solid and meaningful set of indicators for the circularity of water.

**NOTE | Separate indicators**

The resulting outcomes from the four Close the loop indicators

- % circular inflow
- % circular outflow
- % water circularity
- % renewable energy

remain separate outcomes and are not combined into one score.

## 2. OPTIMIZE THE LOOP

**This module provides insights on resource use efficiency. The indicators included are optional.**

### Critical materials

The first indicator is **% critical inflow**, which highlights the share of the linear inflow considered critical or scarce. This allows companies to assess the risk level of specific material flows and to prioritize accordingly. The calculation is:

$$\%\ \text{critical inflow} = \frac{\text{mass of inflow defined as critical}}{\text{total mass of linear inflow}} \times 100\%$$

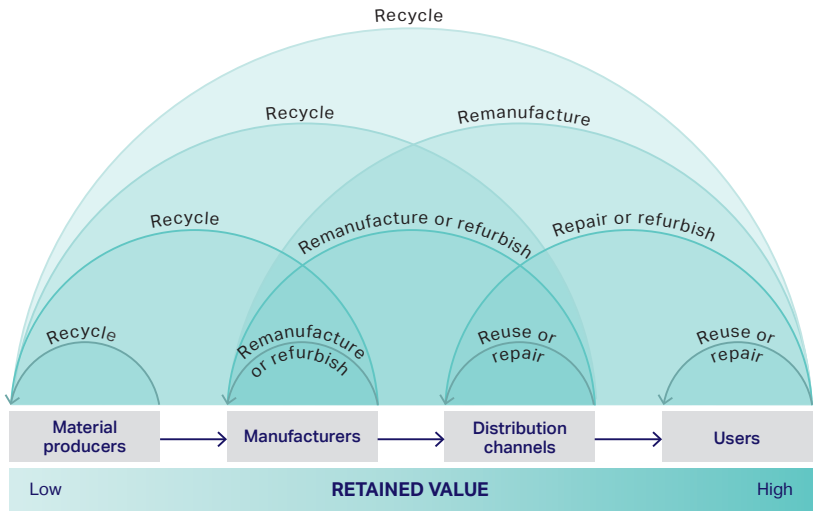
The CTI online tool can also provide feedback on absolute mass values for additional insight.

### Recovery type

The second indicator of the Optimize the loop module **% recovery type** focuses on how material is recovered and recirculated into the value chain. The results provide a breakdown of the shares of recovered material that are reused/repaired, refurbished, remanufactured, recycled or biodegraded/composted. The CTI online tool automatically generates this breakdown based on the Close the loop data entered.

Depending on the value chain position of the company, the possibilities for optimization in recovery loops may be limited. The feedback from the CTI tool takes this into account.

**Figure 4:** Recovery types and retained value



## 3. VALUE THE LOOP

**This module illustrates the added business value of a company's circular material flows. The indicator is optional.**

### Circular material productivity

The indicator in the Value the loop module is **circular material productivity**, which expresses revenues generated per mass unit of linear inflow. The outcome is a conceptual number that will become more meaningful after monitoring over time.

The calculation is:

$$\text{circular material productivity} = \frac{\text{revenue}}{\text{total mass of linear inflow}}$$

The greater the circular material productivity, the better a company is decoupling financial performance from linear resource consumption.

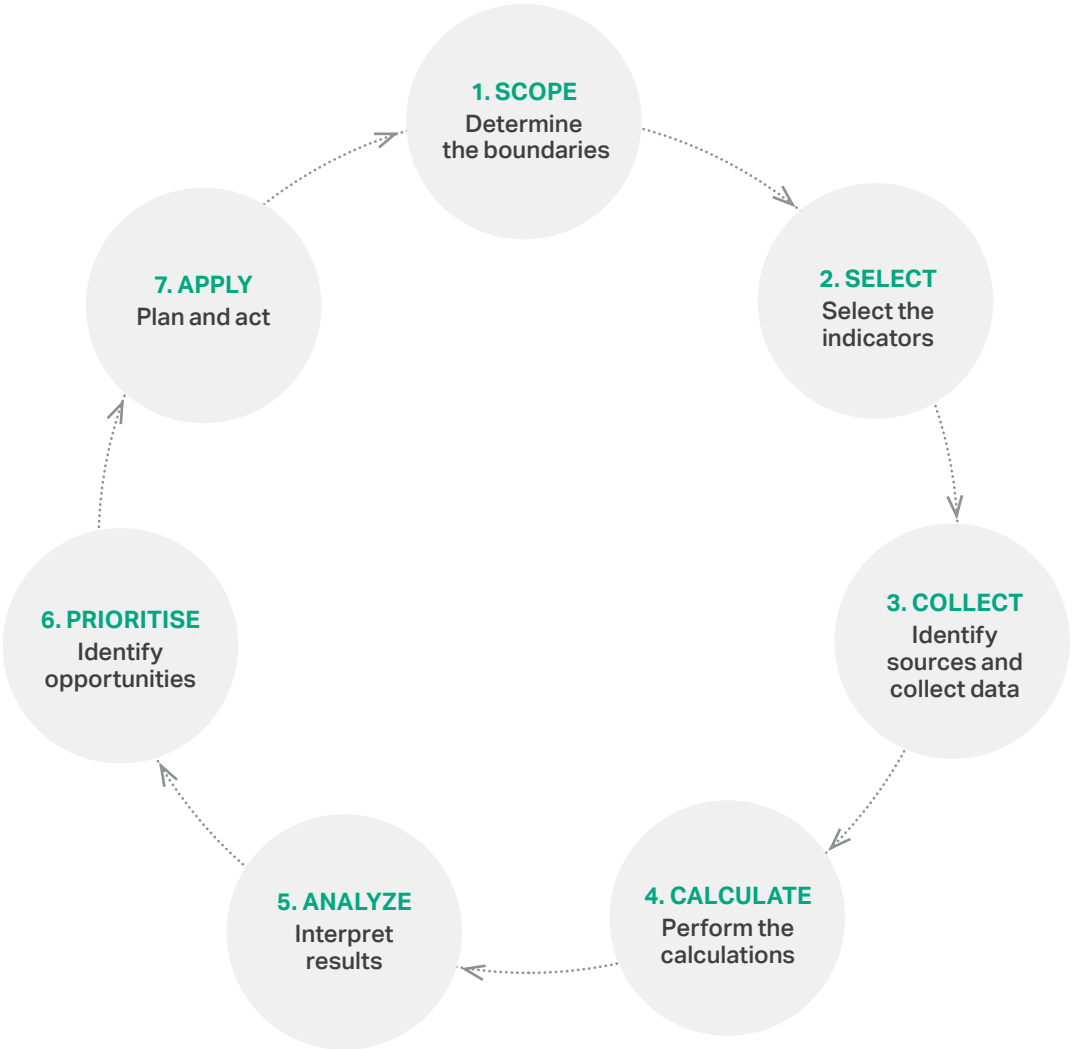
# The CTI process

The framework outlines seven process steps that cover one assessment cycle. Running the assessment for the first time will be informative and insightful. However, repeating the cycle regularly allows the company to monitor progress in its circular transition.

Certain indicators, like circular material productivity, will in fact be based on a year-on-year score to compare performance over time. This means they may be difficult to interpret after the first cycle as this sets the baseline. Monitoring trends will become more meaningful over time.

**NOTE | Compatibility**
This process step approach is adapted from and consistent with other industry frameworks, like the Natural Capital Protocol.[15]

**Figure 5:** The process cycle



# Getting started

If you are interested in learning more and/or potentially using the CTI and the online tool to start calculating your company's circularity, we have a few recommendations.

It may seem like a challenging exercise, but there are several free resources that can help you start.

- The user manual with more in depth instructions on how to find data, interpret outcomes and convert insights into action on page 23.
- The CTI online tool with guidance to take companies through the process step by step.
- A webinar video to introduce you further to the framework, available at: www.wbcsd.org/ctice.
- Use cases that over time will increase in number and represented industries, available at: www.wbcsd.org/ctice.

Additionally, we host interactive webinars to help companies better understand the CTI and to answer questions.

These are some recommended next steps:

1. Go to www.ctitool.com, sign up for a free account and explore what the CTI Tool has to offer and how it works.
2. Read the user manual (page 23) and get familiar with the CTI framework.
3. Take a look at the scope phase (page 24) in the user manual and start conversations in your company on the questions in the section. Including your wider stakeholder network in these discussions can be valuable.
4. Sign up for a webinar or organize a training with your team to help bring everybody up to speed. Find more information on: www.wbcsd.org/ctice.
5. Start with a simple, small scoped test assessment, something you might have data available for already.

**NOTE**
**Keep in touch!**

**Stay informed**

Regularly check www.wbcsd.org/ctice for updates on the framework.

- Sign up for the CTI circular and receive update notifications to the framework.
- Keep an eye on the events calendar for planned webinars and trainings and sign up.

**Get involved**

- Share your insights and ideas through the feedback functionality in the CTI online tool www.ctitool.com
- Actively help shape the future developments of the CTI by joining WBCSD and the Factor10 Circular Metrics working group. cti@wbcsd.org

# Continuous improvement

The launch of this framework constitutes a big milestone for the working group. We're excited to see how the Circular Transition Indicators work in practice to stimulate insights and action.

For the past 18 months we have developed and tested the methodology and online tool several rounds and published a draft framework for public consultation. In total we processed over 2,000 feedback entries coming from over 200 individuals in both public and private sector from all over the world. The broad support and amount of constructive feedback processed gives confidence that with the CTI we provide a valuable tool for both companies and the circular economy at large.

However, this is a work in progress.

The circular economy is a fast-developing space and priorities are continuously evolving. Although the CTI provides structure to today's mostly conceptual conversations, it must be adaptive to remain relevant. Therefore, this is CTI version 1.0. Certain core concepts and principles will remain, but their use must evolve.

That is why the working group will continue its work focusing on several areas:

### Promotion

The more companies use the framework, the more cross value chain conversations there will be. The more data the tool can collect, the quicker it will be able to provide truly anonymized industry and regional data averages.

### Development of case studies

These can help interpret the concepts at the industry level and bring the theoretical framework to life.

### Monitoring

For both the CTI and the online tool, we will be closely reviewing and monitoring companies' usage to further understand needs and required developments.

### New indicators needs

Development of the % water circularity indicator is already underway and expected for inclusion in the next version in 2021. Other indicators are also being considered by the working group.

### Link with investor

We will investigate future expansion to include finance and investor perspectives and needs, an important driver behind the transition.

Check www.wbcsd.org/ctice regularly for updates.

**NOTE**
**Requested indicators:**

These are the indicator needs we heard from you during the public consultation:

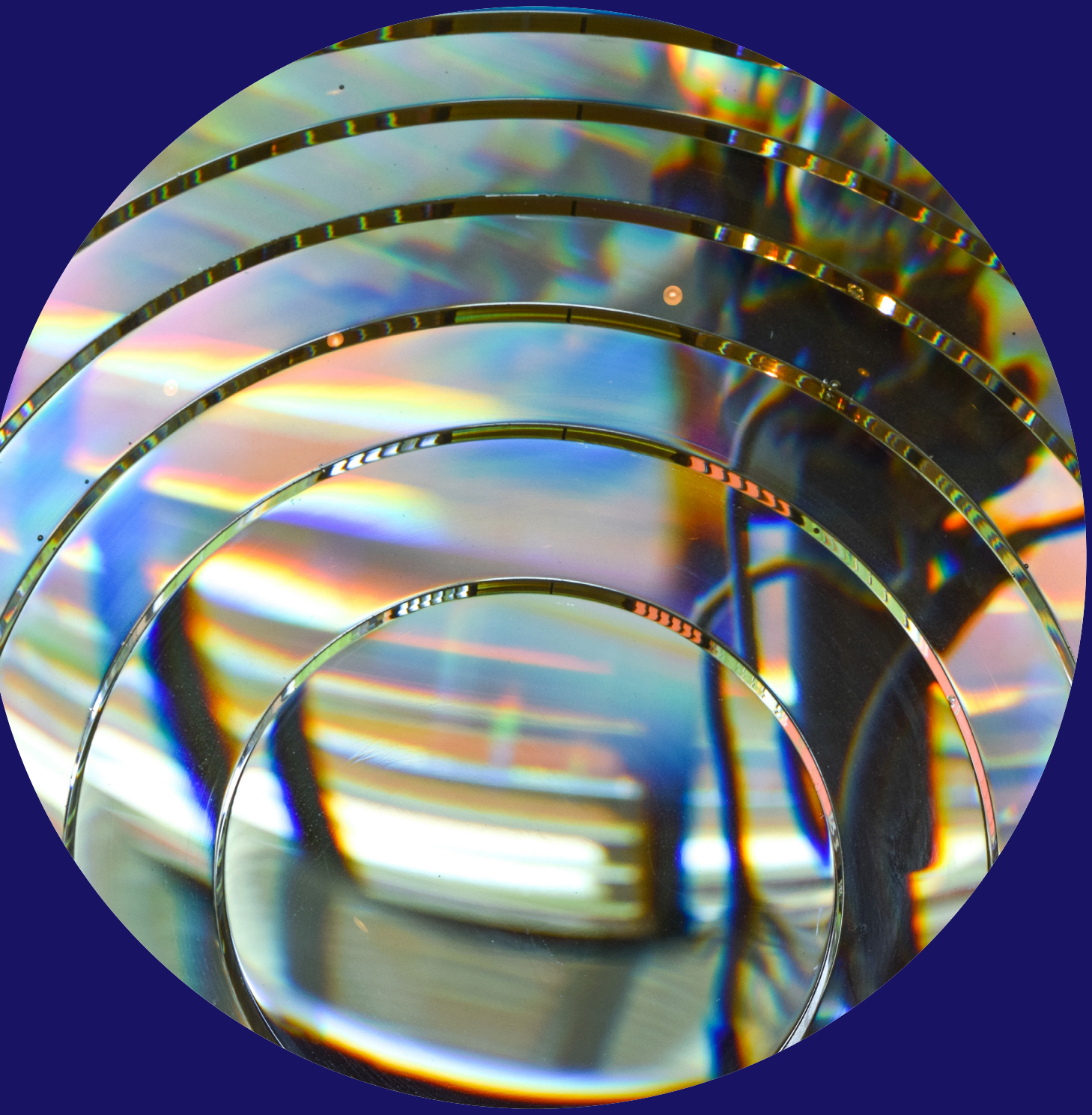
- Environmental and social impact
- Land consumption
- Material toxicity and safety
- Circular strategies such as durability and use optimisation
- Finance and investor metrics
- Regional context
- Value creation and business performance
- Number and quality of created jobs

Thank you for sharing your interests. We will consider these to start further indicator developments.

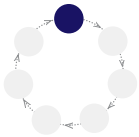
If your company is interested in playing an active role in further improving and developing the CTI, please contact the WBCSD Circular Metrics team at cti@wbcsd.org.

Part 2.

# Circular Transition Indicators: User manual V1.0



# ① Scope
## Determine the boundaries



Before choosing indicators from the indicator menu, it is recommended to plan your circularity assessment to ensure that you:

- Invest your time in finding the right data sets for the right reasons;
- Know what insights you're looking for in the outcome of the assessment; and
- Have a plan for how you can take them forward.

Starting question: **What is the intent for the assessment?**

Consider the following questions in setting the objectives:

- Why is circularity important for the company?
- What questions do we want to answer by doing this assessment?
- Who is the audience of the assessment's outcome and insights? What do we want this audience to do with these insights and information? What other questions are they likely to ask after seeing the results?
- What material streams should we focus on? Where could impact drive optimal value for all stakeholders?

Stakeholder dialogue and collaboration here may be valuable.

Once the objectives are set, use these questions to establish your scope:

### 1. What level of the business do we assess?

You can assess the full company, but also specific parts of the company, such as a business unit, production facility or product line.

### 2. What is the timeframe?

A yearly timeframe consistent with annual financial cycles will be a natural choice. However, it could be useful to use a production cycle or another more meaningful timeframe (such as one that is relevant to the construction sector or for capital equipment). Give this consideration some serious thought and choose something that complements the other scope parameters.

### 3. What do we include and exclude?

For most companies, it will be extremely difficult to get all data on 100% of all material flows. This means that you might not include some flows in the assessment or that you may have to use proxies and assumptions. The company is free to set these proxies, assumptions and excluded material flows, but it is recommended to have them documented as clearly as possible before starting the assessment.

**EXAMPLE**
**Questions**

Questions could be:

- Where do I start and what are my opportunities?
- Which of our business units is the most circular and how can we adopt cross learnings?
- How do I assess whether my circular activities are good for my business?

**EXAMPLE**
**Audience**

Who do we want to talk to about this: the board, our employees, our suppliers, our clients? And what do we expect from them after we present our findings?

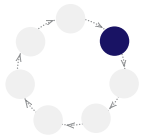
**EXAMPLE**
**Focus materials**

This mass-based methodology presents a risk of overlooking potential in material flows that are inherently light in weight (e.g., plastics and packaging). This is the moment where your team should determine any material streams you want to put extra focus on to ensure you capture opportunities.

**EXAMPLE**
**Excluded flows**

For manufacturing companies, the relative mass of operational materials (e.g., office supplies) as compared to production resources may be negligible. It could make sense for such a company to decide to not include such relatively small flows in the assessment.

# ② Select
## Select the indicators



Once your company understands its objectives, the CTI offers a menu of indicators that enable the company to answer the questions from the scoping step.

### CLOSE THE LOOP

**A company's ability to close material loops sits at the heart of the framework.**

Consequently, companies start their assessment with these indicators:

- % circular inflow
- % circular outflow
- % water circularity
- % renewable energy.

### OPTIMIZE THE LOOP

**These indicators illustrate how companies perform in maximizing resource efficiency beyond ensuring material loops.**

The module includes two indicators:

- % critical materials
- % recovery type.

### VALUE THE LOOP

**This module provides insights into the value the circular business creates.**

It connects the material flow indicators with conventional financial metrics. The first indicator in the module is:

- Circular material productivity

While selecting your indicators, it is recommended to consider each indicator carefully and document why you have chosen to assess each one, as well as why you have excluded any.

**EXAMPLE**
**Question A**

**How can two business units learn from each other's circularity performance?**

Running the assessment for both business units can help compare them and allow for the replication of best practices across units.

**EXAMPLE**
**Question B**

**How can we present the circular business performance to our CFO?**

Circular material productivity can help determine the financial and economic performance of circular business, enabling communication with internal stakeholders.

**EXAMPLE**
**Question C**

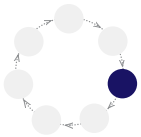
**Which materials could provide a starting point for our circular procurement strategy?**

% critical materials gives an indication of which materials the organization could prioritize to reduce its supply risks.

**NOTE**
**Questions?**

Does your organization have questions that these indicators don't help answer? Contact the WBCSD Circular Metrics team at cti@wbcsd.org to explore if additional indicator development could be beneficial.

# ③ Collect
## Identify sources and collect data



Data collection is likely to be the most labor-intensive part of the process. Some data points might be relatively easy to obtain, while others will require collaborating with other departments. It is likely that companies will have to connect with value chain partners to gather the relevant data, particularly on inflow and actual outflow recovery numbers.

The following is the list of data sets required for each indicator module.

### CLOSE THE LOOP

**% circular inflow (per material flow)**

- % of renewable content or % non-virgin content
- Mass of inflows

**% circular outflow (per material flow)**

- % of the recovery potential (see guidance on determination on page 30)
- Mass of outflows
- Material recovery rates
  - > Regional recovery rates
  - > Sector-specific recovery rates
  - > Material recovery rates from own buy-back/take-back contract, partnership system, collection and recovery programs, etc. (if applicable)

**% water circularity – under development**

**% renewable energy**

- Renewable energy used (annual consumption)
- Total energy used (annual consumption)

### OPTIMIZE THE LOOP

**% recovery type:**

- Recovery type per recovered outflow (e.g., reused, repaired, refurbished, remanufactured, recycled).

### VALUE THE LOOP

Circular material productivity

- Revenue of assessed part of the business.

**NOTE**
**Material flow analysis**

Respondents to the public commenting process have suggested that performing a material flow analysis (MFA) could be helpful in preparing for a structured assessment.
We agree this would increase the robustness of the assessment and may be a good option for some companies. However, to optimize accessibility, we have not included it nor considered necessary in the framework as a required process step. Results from existing MFAs could be valuable to start an assessment with.

**NOTE**
**Online tool**

The CTI online tool helps to collect data to minimize the burden of this step.

**NOTE**
**Documentation**

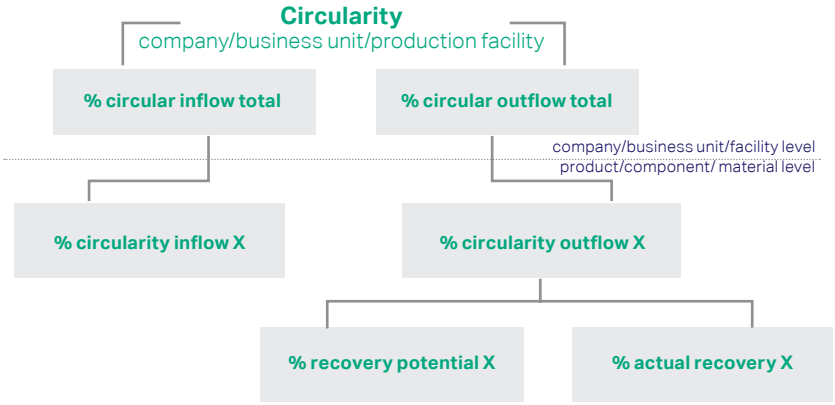
When collecting data, it is recommended to document sources and provide justification. Uploading this documentation in the tool will help retrieve data in upcoming cycles and will enhance the robustness of the results and institutional memory.

# ④ Calculate
## Perform the calculations

### CLOSE THE LOOP

**Figure 6 shows the high-level methodology to calculate circularity**

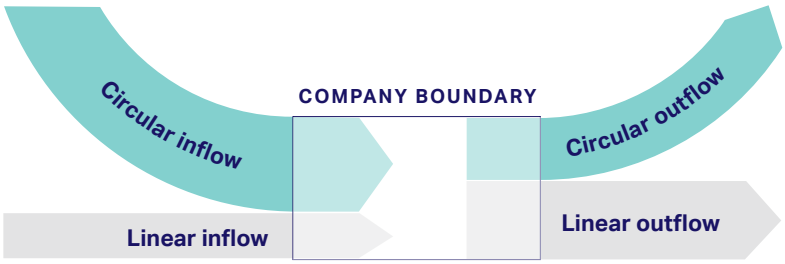
**Figure 6:** High-level formula tree




A company's overall circularity performance represents the balance between linear and circular material flows (see Figure 7) and consists of four main flows through the company: circular inflow, linear inflow, circular outflow and linear outflow.

The overall circularity performance is the average between the % circular inflow and %circular outflow.

**Figure 7:** Four main material flows




Both the % circular inflow and the % circular outflow are made up of the weighted average of the materials' individual % circularity. Therefore, it is necessary to assess the % circularity at a material flow level.

**Figure 8:** Circularity formula

**Circularity**
company/business unit/production facility

**% circular inflow total**

$$\frac{(\%\text{ circularity inflow A} * \text{mass A}) + (\%\text{ circularity inflow B} * \text{mass B}) + (\%\text{ circularity inflow C} * \text{mass C})}{\text{total mass A+B+C}}$$

**% circular outflow total**

$$\frac{(\%\text{ circularity outflow D} * \text{mass D}) + (\%\text{ circularity outflow E} * \text{mass E}) + (\%\text{ circularity outflow F} * \text{mass F})}{\text{total mass D+E+F}}$$

**NOTE**
**Assessment level**

The CTI can assess the full company, as well as specific parts of the company, such as a business unit or production facility.

**NOTE**
**Material flows**

Material flow can include nutrients, compounds, materials, parts, components or even products (depending on the organization).

**Water**

Water is a unique resource used for different purposes. Due to its weight and the quantities companies use, water may distort the outcome of the assessment. Water is therefore not included in overall performance. Rather, it will have its own indicator.

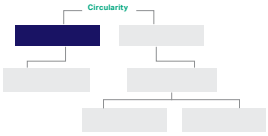
The WBCSD Factor10 Circular Metrics working group and Global Water Solutions Project are joining forces and expertise to develop a solid and meaningful set of indicators for the circularity of water.

## % circular inflow

**This indicator assesses the total circularity of inflowing materials:**

### % circular inflow total

(% circularity inflow A * mass A)
+ (% circularity inflow B * mass B)
+ (% circularity inflow C * mass C)
total mass of all inflow (A+B+C)

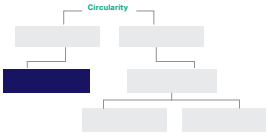



This means that **% circularity of inflow** needs to be determined on a material level.

The classification of inflowing materials is:

- **Virgin – non-renewable (linear)**

  These materials have never been used or consumed (primary) nor are they renewable. For these materials:




% circularity inflow V = 0%

- **Virgin – renewable (circular)**

  Renewable inflow is circular if it is replenished or regrown through ecological cycles after extraction. It is preferably regenerative, and at minimum sustainably managed. (See the glossary on page 48 for complete definitions and references.)

  Inflow may consist of fully or partially renewable content. In this case:

% circularity inflow VR = % renewable content

- **Non-virgin or secondary (circular)**

  Inflow is also circular if it is previously recovered, non-virgin or secondary (e.g., reused, refurbished, remanufactured or recycled).

  Inflow can consist either fully or partially of recovered content, in this case:

% circularity inflow NV = % recovered content

In some cases, inflow can be both renewable and non-virgin. In such cases, the inflow can only be counted in one of the circular categories to prevent double-counting.

### EXAMPLE Classification

Depending on the company and its position in the value chain, it may be challenging to determine the amount of each of the three streams. The most important distinction here is to separate circular from linear flows.

### Waste management

Waste streams that flow into the company may be unidentifiable as to whether it is renewable or secondary. Inherently this incoming waste is not virgin; therefore, in this case, this material can be counted as non-virgin or secondary. As long as any additional flows (like process materials) are accounted for, the rest of the total can be considered as circular.

### Material production

On the other end of the value chain, for material producers it can be much easier to identify virgin renewable and secondary inflows. In this case all remaining inflows are accounted for as linear.

## Alternative calculation method % circular inflow

In addition to the bottom-up calculation of **% circular inflow**, the CTI offers a top-down calculation for the % circular inflow, which may be easier for some companies to use:

### % circular inflow

$$\frac{\text{(mass of renewable inflow + mass of non-virgin inflow)}}{\text{total mass of all inflow}} \times 100\%$$

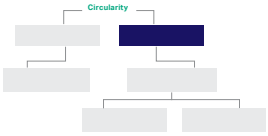
The required data set is the same and the outcome of the two approaches should be the same as well.

## % circular outflow

**Similar to the calculation of the total % circular inflow, this formula assesses the total circularity of outflowing materials:**

### % circular outflow total

$$\frac{\text{(\% circularity outflow D * mass D) + (\% circularity outflow E * mass E) + (\% circularity outflow F * mass F)}}{\text{total mass of all outflow (D+E+F)}}$$



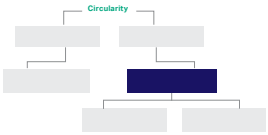

This means that the % circular outflow also needs to be determined on a material flow level.

% circular outflow of a material flow reflects the combined effectiveness of your company to:

1. Design or treat its outflow to be recoverable (e.g., repairable, refurbishable, manufacturable or recyclable). This is the **% recovery potential.**
2. Prove that materials that leave the company do in fact find their way back into the economy. This is the **% actual recovery**.

### % circularity outflow X

% recovery potential X * % actual recovery X




If EITHER the materials are not treated in such a way that they have any technical recovery potential OR the company is not able to ensure materials are brought back into the value chain after their initial lifetime, the outflow is considered linear.

**NOTE | Outflow included**

Flows to consider as outflow include sold product (including packaging), by-product and waste, either in solid, liquid or evaporated form. This can include process or operational by-product or waste.

**EXAMPLE | High potential, low actual recovery**

Old information and telecommunication equipment can often be partially dismantled, meaning they can have high recovery potential.

However, its incineration (either with or without energy recovery) destroys the materials. They lose their value and potential for reuse, refurbishment or recycling and will therefore score 0% in actual recovery, resulting in 0% circular outflow.

## % recovery potential

The **% recovery potential** reflects the ability of the company to design or treat its outflow to ensure materials can technically be recovered (including only material recovery, not energy recovery).

For most flows, the typical categorization is:

**YES, this outflow is fully recoverable – resulting in 100% recovery potential**

Or

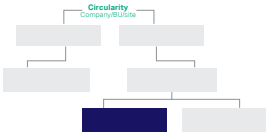
**NO, this outflow is not recoverable – resulting in 0% recovery potential.**

For material streams that consider compounds, components, parts or products, the company may have to determine a partial level of recovery potential. This determination process depends very much on the flows identified, for which guidance is too detailed for this report. Should you require support in determining this for your company, please contact us for additional guidance.

As new technologies develop, drawing the line between circular and linear becomes more difficult. Since debates are raging worldwide on what qualifies as circular for processes such as chemical recycling, this framework does not offer a universal answer. As a temporary guiding principle: if a material on any level (potentially molecular) can remain a material in a second life in a technically feasible and economically viable manner, it is circular. If such a material becomes a fuel or is burned in any shape or form, it is linear.

### % recovery potential X

YES - full potential= 100%
NO - no potential = 0%
some potential = X %
or % biodegradable




## Biological cycle

Any nutrient that the biosphere can naturally, safely and fully absorb and that can be food for new growth of natural renewable materials has 100% recovery potential.

Any substances that nature cannot absorb or that are toxic (solid, liquid or evaporated) have 0% recovery potential, unless they are recoverable in the technical cycle.

### EXAMPLE
### Panels

Construction panels produced by gluing metal and plastic sheets together will have no recovery potential as, after the product's technical lifetime, it is not possible to separate and recover these materials. The recovery potential is 0%.
In comparison, panels connected with screws or rivets can have 100% potential, since it is possible to separate and recover both materials (depending on the individual material characteristics). The screws or rivets may even be reusable or recyclable.

### EXAMPLE
### Paper

Natural paper can be 100% recovered through the biosphere.
However, contamination by bleaching, dying, printing or coating with inorganic substances can disturb its biodegradability, making it unrecoverable, and could therefore cause it to have 0% recovery potential.

### Questions?

Should you require help in your assessment of material flow recovery potential, contact the WBCSD Circular Metrics team for help with specific guidance.

## % actual recovery

The **% actual recovery** captures the amount of materials actually recovered after they leave the company's boundary.

Recovery is not the same as collection. After collection, materials can still end up in landfill or incinerated. This is why this indicator is not based on estimates but requires actual data. If your company keeps control and tracks its product flows after they leave your facility, this data should be available. For transparency and robustness, when using internal recovery data for the calculation, it's recommended to ensure it is properly justifiable and documentation is secured.

In case your company does not keep track of its outflows, it can refer to standard recovery rates available for a wide range of materials. The CTI online tool embeds some of these rates.

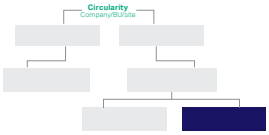
Recovery data is dependent on region or sector. For an accurate view it is recommended to consider default rates for the product/material based on the geographic scope of sales/use and/or sector-specific data, where available.

In cases where no data is available for your particular flow AND downstream tracking is not conducted, the actual recovery is 0%.

The challenge in monitoring material flows, particularly multiple steps up or down the value chain, is recognized. Only through value chain discussions is it possible to effectively communicate the importance of collecting and sharing this data. The hope is that the CTI provides a consistent process and reason to initiate these discussions, if they have not started already.

**% actual recovery X**

standard recovery rates
or regional/sector recovery rates
or manual recovery rate + justification




### Biological cycle

Biological outflow that enters the biosphere (through air, water or ground) can be considered as recovered only if it will function as a nutrient in the biosphere and if it can become part of the biocycle.

### EXAMPLE
### Fashion

Some clothing brands collect old garments with the ambition to recycle them. This framework only considers the actual fabric and fibers that find their way back into another used garment, accessory, household cloth, etc. as recovered.

### Selling light

In addition to buying lightbulbs, it is now possible to solely buy light. In a maintenance contract, the lighting company retains ownership of the light fixtures, allowing it to maintain control of outflow and data on repaired and reused material and making it available internally.

### T-shirt

When a biodegradable product (like a cotton t-shirt with no toxic dyes) ends in a landfill, the toxic mix of combined waste contaminates it and it can no longer serve as nutrients in the biosphere. Although it had a recovery potential of 100%, it is considered linear outflow.

## Cascading

Recovery goes beyond giving a material a second life. The current criterion for circular flow is that the material is technically brought back to the state of inflow where it entered the company (whether it is a material, part, product, etc.) at the same functional equivalence. This same functional equivalence means that the company can use it for a different purpose but with similar function.

Materials turned into energy through incineration are not circular in this framework as they do not return at the same functional equivalence and will have no life after incineration.

**NOTE | Circularity is not always more sustainable**

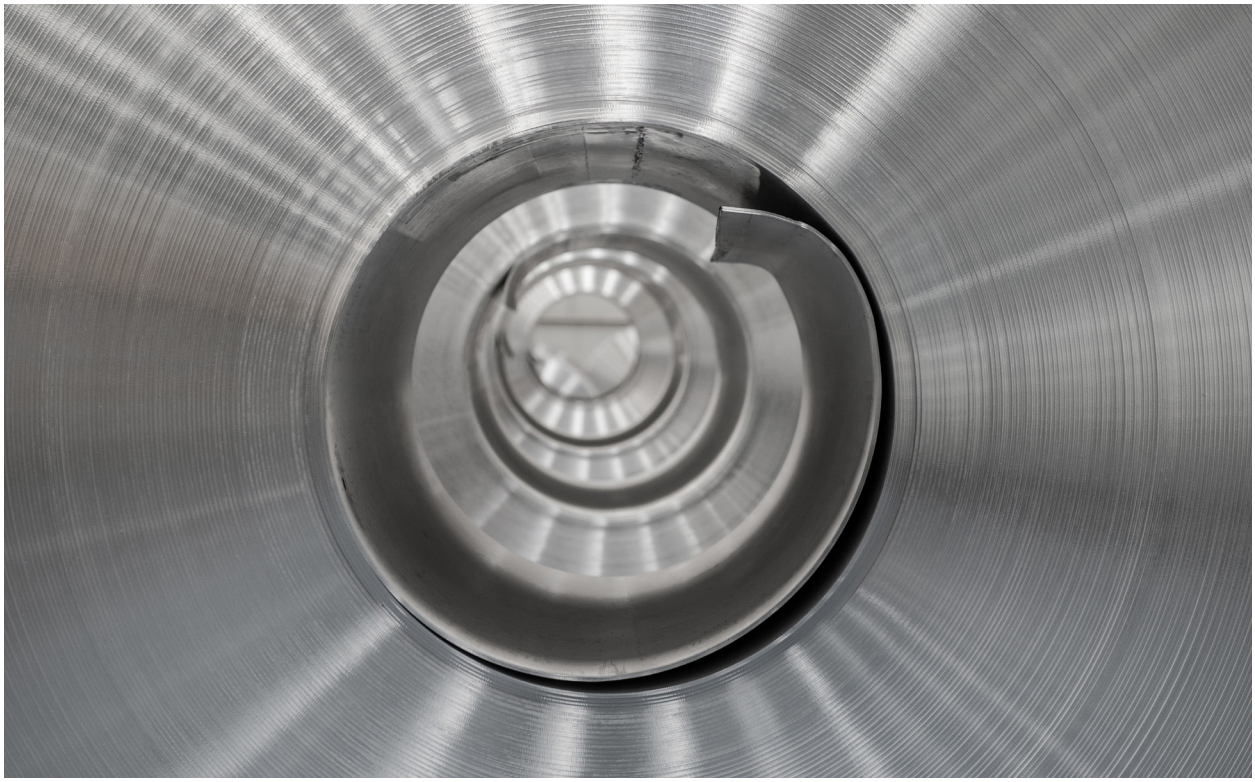
As mentioned, the CTI is a complementary framework to existing sustainability indicators. Although the CTI does not consider waste to energy as circular, this does not mean it is unsustainable. It is still up to the company to determine the most appropriate way of channeling its material flows. Circularity is a strategy to reduce material extraction and waste generation but may not be the leading criterion for all individual material flows.

**EXAMPLE**
**Plastic**

If a high-grade plastic in small IT equipment is not reusable in the same product but is reusable in the body of a coffee machine and can loop multiple times as recycled content, it is circular since this is functionally equivalent.

**EXAMPLE**
**Rubber**

Ground-up tires used in playground floor tiles are considered circular when, after their life as playground flooring, they could be used again, either as new playground flooring or something else.



## % water circularity

Freshwater is a finite yet vital resource. It is critical to use it responsibly and to apply circular principles where possible.

Over the course of the development of the CTI, a subset of the working group has worked on what circularity means in the context of water and how circular principles could translate into a meaningful indicator.

As of launch of the CTI, this work is still ongoing. As the topic is complex, we decided to not propose a placeholder instead.

The working group on this specific topic has been expanded to a combined working group of members of the WBCSD Global Water Solutions Project and the Circular Economy Factor10 project to ensure the inclusion of all expertise. The aim for this group is to present an indicator and include it in the CTI online tool by January 2021.

## % renewable energy

In a circular economy, energy production depends on the renewable source and shifts away from fossil fuels.

Because of the complexity involved in calculating it and the potential to cloud the results, the CTI measures renewable energy used for business operations separately.

The formula for the % renewable energy is:

$$\%\ \text{renewable energy} = \frac{\text{renewable energy (annual consumption)}}{\text{total energy (annual consumption)}} \times 100\%$$

Companies already use globally recognized and generally adopted protocols for measuring and reporting renewable energy consumption.

In line with WBCSD's approach, the CTI allows companies to use existing policies and procedures, permitting the reuse of existing data sets.

Should you need guidance on the definition of renewable energy, please refer to the energy sources published by IRENA (International Renewable Energy Agency).[16]

- Solar energy
- Wind energy
- Hydropower energy
- Geothermal energy
- Ocean (tidal) energy
- Bioenergy

Measurement expresses the energy content and includes all the energy carriers that flow into the company (including, but not limited to, gas, electricity and fuels).

**NOTE**
**Water use cases**

Organizations can use water for different purposes internally:

1. As an ingredient, in which case it shows up on a company's or product's bill of materials
2. As a process material for cooling, washing, watering of livestock, feedstock and commodity or other.

**Only in the first case**, where water is an ingredient of your product or is the actual core product of your organization (e.g., utility sector), can it be included in the Close the loop calculation for material inflow and outflow.

**NOTE | Energy and outflow**

Some protocols may classify the incineration of biobased materials as a renewable energy source.

Although the energy from biobased waste may be renewable, as the materials cease to exist post-incineration, the CTI considers them linear material flows.

**NOTE | Material flows and energy generation**

Inflow for energy generation can be classified as circular inflow if it is rapidly renewable or non-virgin.

Outflow that is either used as fuel and/or is incinerated is always classified as linear.

## OPTIMIZE THE LOOP

### Critical materials

This indicator provides a first impression of the percentage of inflow at risk by making an initial distinction between critical and non-critical materials.

The first step is to identify, within the defined linear inflow, what mass of the total linear inflow is critical. Critical materials are prone to becoming scarce in the near future and are difficult to substitute without hampering functionality. Several institutions have identified scarce and/or critical raw materials. For example, the European Union (EU) lists 27 raw materials as critical.[17] In addition, the United States has developed a list of 35 mineral commodities deemed critical to US national security and the economy.[18] These lists do not include criteria on problematic supply chains, such as from human rights violations perspectives. Time may see the addition of other sources, including human and environmental capital related supply chain issues.

Other authorities may be developing or have already published comparable lists of critical or scarce materials. Although regional lists can deviate, materials that appear on any list warrant a second look.

The formula for the % critical inflow is:

$$\%\ \text{critical material} = \frac{\text{mass of inflow defined as critical}}{\text{total mass of linear inflow}} \times 100\%$$

In addition to the % critical inflow, the CTI online tool also provides feedback on critical material use in absolute numbers.

Feedback at launch is based on the EU and US lists of sources mentioned above.

**NOTE | Critical materials**

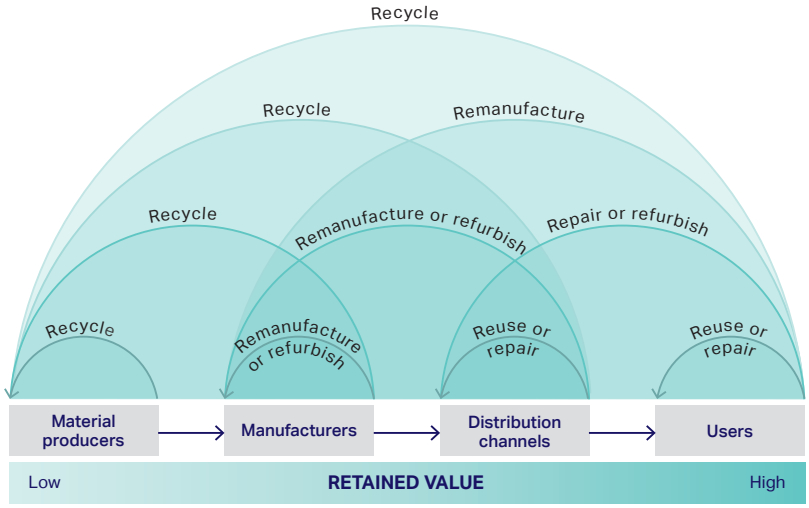
Obtaining this information may be challenging, in particular for industries with high product complexity, e.g., in the electronics sector. Additionally, critical materials might exist in very low quantities in components that travel through the value chain.

The company can decide whether to assess the exposed risk associated with a dependency on any of these materials. Efforts to gain supply chain transparency at this level could be significant. On the other hand, the risks involved could be worth looking into.

## Recovery type

As illustrated in Figure 9, tighter recovery loops typically require less energy or processing and are more efficient forms of material/product recovery. For example, repairing instead of recycling a product requires fewer logistics and less reproduction and retains more product value.

**Figure 9:** Retained value




Generally, it is in the best interest of a business to explore opportunities to keep recovery loops as tight as possible.

The CTI online tool includes optional data entry at the material level, specifying the type of recovery used for recovered materials. The feedback provides a breakdown of the shares of recovered material reused/repaired, refurbished, remanufactured, recycled or biodegraded/composted.

**NOTE | All loops are equally circular**

Although tighter loops are generally preferable, all types of recovery are equally circular in the CTI. As such, all recovery types contribute to a company's circularity performance equally in the Close the loop calculations. This means that a shift in recovery type will not change the % circular outflow. The circular material productivity indicator would, however, capture the retained value.

## VALUE THE LOOP

This module helps companies gain insights into how effective they are at generating revenue per unit of material they depend on.

The first indicator launched in this module is circular material productivity, which expresses the value a company generates per unit of linear inflow. The outcome produces a value that companies can monitor over time.

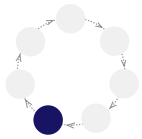
The calculation is:

$$\text{circular material productivity} = \frac{\text{revenue}}{\text{total mass of linear inflow}}$$

An increase in this indicator demonstrates a successful decoupling of financial growth from (linear) resource dependence.

New indicators may follow for this module.

# 5 Analyze
## Interpret results



This section focuses on interpreting the results for decision-making. It is recommended to involve the relevant decision-makers in this part of the process.

The results from the CTI calculation provide the quantitative foundation for identifying, prioritizing and implementing circular initiatives.

### CURRENT PERFORMANCE AND PERFORMANCE OVER TIME

#### Current performance

The CTI was developed for wide applicability across various companies, industries and value chains. As performance is likely to vary substantially depending on the company's characteristics, the model does not subjectively judge what "bad" or "good" performance is. The CTI empowers companies to study their own potential for improvement by examining the percentage of their business still considered linear. Analyzing the underlying indicators is relevant to understanding what
is needed to increase the level of circularity.

#### Performance over time

The most valuable insights might come from tracking performance over time. Progress can be compared to any time-bound goals, objectives or targets that the company has formulated. An increase or decrease in circularity could also be compared to the change in performance on a global level (such as Circle Economy's Circularity Gap Report)[19] or on an industry level (either via governments or via aggregated data from companies or industry associations).
If performance does not meet the expectations, the company may further analyze the underlying indicators and parameters that influence their outcomes.

## ANALYSIS OF THE UNDERLYING INDICATORS: CIRCULAR INFLOW AND CIRCULAR OUTFLOW

The results are often based on a broad range of flows that enter and leave the company, which can differ significantly on the mass and circularity parameters.

### The mass of material flow

A mass-based indicator means heavier material flows have a greater contribution to the percentage. A relevant assessment is to list the linear material streams from largest to smallest mass. Closing the loop on the larger mass streams will provide a larger contribution to the level of circularity. However, this may result in the overlooking of other parameters, such as critical or priority material flows.

### The circularity of the flows

The circularity of the inflow streams depends on the characteristics of the streams as either renewable or non-virgin. The opportunity for improvement is in assessing the characteristics of the largest linear inflow streams and searching for renewable or non-virgin alternatives.

The circularity of the outflow streams contains two components: recovery potential and actual recovery. To improve recovery potential, the analysis focuses on opportunities to optimize the design. For example, modular design, design for disassembly, repairability, high recyclability by using mono-materials, etc.

Improving actual recovery requires different actions. For example, adopting new business models such as product-as-a-service or buy-back/take-back schemes will likely significantly improve actual recovery rates. Another option is to collaborate with value chain partners that drive circularity, bringing more clarity into mass flows down the value chain and a greater ability to develop a shared value proposition.

**EXAMPLE**

**Non-virgin inflow**

A construction company could increase circularity levels by replacing virgin steel beams with reused beams or recycled steel.

**Renewable inflow**

A cosmetics company could increase circularity levels by replacing synthetic ingredients with biobased content.

**Recovery potential**

An ICT company could change the design of a product to enable disassembly, allowing for repair, reuse and refurbishment.

**Actual recovery – business model**

An ICT company could change to a pay-per-use-business model, enabling higher collection and reuse rates.

**Actual recovery – collaboration**

A company producing electronic equipment could collaborate with a retailer to collect used equipment by stimulating the consumer with a take-back scheme, ensuring the recovery of parts and materials.

## ENERGY AND WATER

### Renewable energy

This indicator demonstrates the percentage of renewable energy used. In theory, a fully circular economy runs on renewables and therefore the goal should be to reach 100%. Opportunities for improvement are:

- Decreasing overall energy consumption (relative to increasing the % of renewable energy used), or
- Substitute fossil fuels with renewable alternatives.

### Water circularity – under development

## OPTIMIZE THE LOOP INDICATORS

### % critical materials

The results of this indicator demonstrate to what extent a company is dependent on materials identified as critical. Even if the percentage of critical materials is small, it may be relevant to further analyze them to understand:

- The diversity in critical materials
- The substitutability of critical material
- The absolute use of critical materials
- Revenue dependent on critical materials (revenue at risk).

*The characteristics of the critical materials*

A company may have multiple critical materials in its inflow. It is important to understand the nature of these materials. Not all materials defined as critical have the same score on criticality, which is a combination of supply risk and regional economic importance. It can be relevant to evaluate the critical material flows based on size, revenue dependent on the flow, and the relative criticality of the material.

*Substitutability of the critical materials*

If it is possible to substitute the critical materials with alternative, non-critical materials with the same or similar functionality, a company may partly mitigate its risk. Therefore, it is relevant to assess whether any substitutes are available.

*The absolute use of critical materials*

Even if the relative use of critical materials (in percentage) is low, the absolute amount or costs of critical materials could reach a point where absolute scarcity, price increase and price volatility affect business continuity. Therefore, it can be relevant to also monitor the absolute use of critical materials.

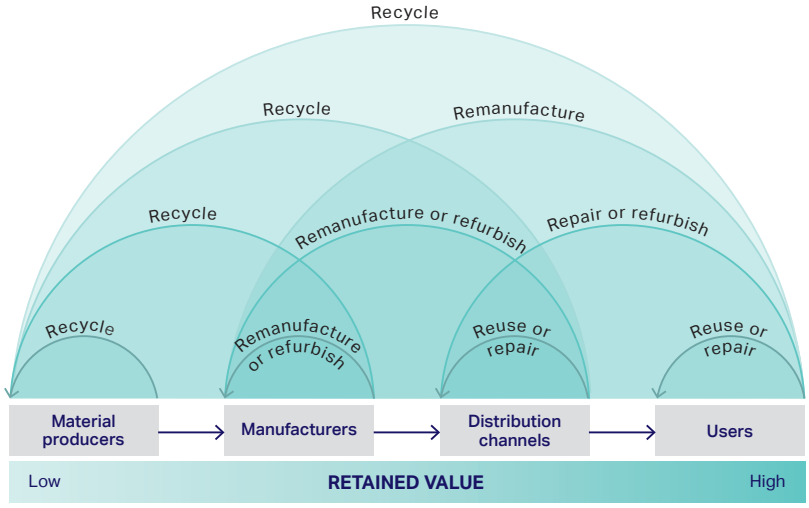
**NOTE | Nature of a critical material**

- What material is it?
- What is the respective criticality of the material?
- Is the material virgin or secondary?

### Optimize recovery types

The opportunities to shift between the recovery types will largely depend upon the type of company and position in the value chain. Nonetheless, a company may evaluate the opportunities to ensure it retains the highest material value. For insights into use of the different recovery types, the online tool can provide additional feedback (upon entering data) to facilitate the analysis of the outflow. Based on these insights, a company can decide to apply new business models or establish new value chain collaborations.

**Figure 10:** Recovery types




## VALUE THE LOOP INDICATOR

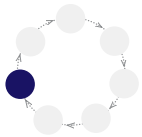
### Circular material productivity

This indicator expresses monetary value per unit of mass. This absolute value will vary greatly across companies and it is best to use it to compare the performance over time. An increase in circular material productivity demonstrates a decoupling of financial growth from circular material use.

In addition, it is relevant to compare a decrease or increase in linear material productivity externally. For example, if enough anonymized and aggregated data is available, one possible insight is that the company had a 2% increase in circular material productivity over one year while the sector had a 5% increase, which could indicate that the company has additional opportunities to seize.

Even though the calculation for circular material productivity is not the same as that for domestic material consumption (DMC)/gross domestic product (GDP), both metrics demonstrate decoupling. Therefore, it might be interesting to compare changes in circular material productivity with the increase in DMC/GDP on a national or sector level.

# 6 Prioritize
## Identify opportunities



The insights gathered on circular performance indicate which flows have the greatest potential. However, to use this information to make decisions and prioritize, the company might want to understand how circular performance relates to linear risks. By assessing company exposure to risks, and by subsequently evaluating opportunities via a business case, companies can start prioritizing actions.
For this section, we refer to WBCSD's 2018 Linear Risks report,[20] which explains circular risk and opportunities.

### IDENTIFY LINEAR RISKS AND CIRCULAR OPPORTUNITIES

As it is possible to link the indicators used in the assessment to linear risks and circular opportunities, these connections can give the company an initial picture of what kind of risk and opportunities are relevant (see table 1).

**Table 1: Examples of risks and opportunities (might contain overlap; list is not exhaustive)**

| Type of risk | | Market | Operational | Business | Legal |
|---|---|---|---|---|---|
| **Definition** | | Involve market- and trade-related factors that impact business assets and liabilities | Involve factors that impact a firm's internal operations | Are a result of emerging societal, economic and political trends that impact the firm's strategic business objectives | Arise from current as well as future regulations, standards and protocols |
| **% circular inflow** | Opportunity | Cost advantage non-virgin resources | New partnerships | Disruptive new technologies | Renewable resource subsidies |
| | Risk | Resource price volatility | Supply chain failures | Changing consumer demand | Fines or lawsuits |
| **% circular outflow** | Opportunity | Waste as a resource | Attracting and retaining talent | New business models | Governmental stimulation of circular solutions |
| | Risk | Trade bans (on resources & waste) | Internal process failures | Changing consumer demand | Extended producer responsibility |
| **% renewable energy** | Opportunity | Abundance of renewable resources | New partnerships | Decreasing cost of renewables | Renewable energy subsidies |
| | Risk | Resource scarcity | Supply chain failures | Increasing fossil energy prices | More stringent laws |
| **% critical materials** | Opportunity | Closing the loop | Job creation | Disruptive new technologies | (New) government policies |
| | Risk | Lower investor interest | Worker safety issues | Changing consumer demand | Sourcing rules and regulations |

## LINEAR RISK ASSESSMENT

It's recommended to assess the identified risks to prioritize actions. The risk assessment can be as simple (half-day workshop with experts in the company to go through the steps) or as elaborate (days to weeks with detailed data for thorough analysis) as desired, depending on the needs and resources of your company. Either way, the following steps are recommended:


### 1. Scenario planning

The endless scenarios for a transition to a circular economy all bring different risks and opportunities. By researching and forecasting different scenarios, the company will be able to include future developments into its business case assessment. The following scenarios are recommended to be included:

- Business-as-usual (BAU)
- In line with targets set at a national or international level
- Combination of global trends.

Within these scenario analyses, companies can decide upon the metrics to use to assess the impact that these linear risks have on the business: either monetary, quantitative or qualitative metrics.
The following are suggested:

- Costs
- Revenues
- Profit
- Customer relationships
- Employee relationships
- Supply chain collaboration.

In addition to scenario analysis, other tools might be useful, including expert input, forecasting and valuation and other ESG-specific tools. The COSO Enterprise Risk Management (ERM) framework elaborates on all of these.[22]

**EXAMPLE**
**National or international level targets scenario**

Various countries and international authorities, like the European Commission, have set goals and targets to adopt a circular economy. Policy packages describe (potential) policy measures over time. It is relevant to describe how those would influence the four risk categories and how it relates to the targets formulated at the company level.

**NOTE**
**Policies**

For an overview of circular economy policies, refer to Factor10's policy workstream.[21]

### 2. Threat and vulnerability assessment

To use the information gathered for decision-making, rank and prioritize the risks. Common criteria for risk prioritization are severity of adverse impact and likelihood; however, relying on these factors alone might limit the accuracy of the prioritization. Therefore, we suggest using two more-elaborate criteria defined by the COSO ERM framework:

- **Threat** (inherent risk), where the impact (the consequences) and the velocity or speed of onset (the speed at which risk impacts an entity) determine the magnitude of the threat.
- **Vulnerability** (residual risk), defined in terms of adaptability and recovery. The magnitude of the vulnerability depends on adaptability (the capacity of an entity to adapt and respond to risks) and recovery (the capacity of an entity to return to tolerance).

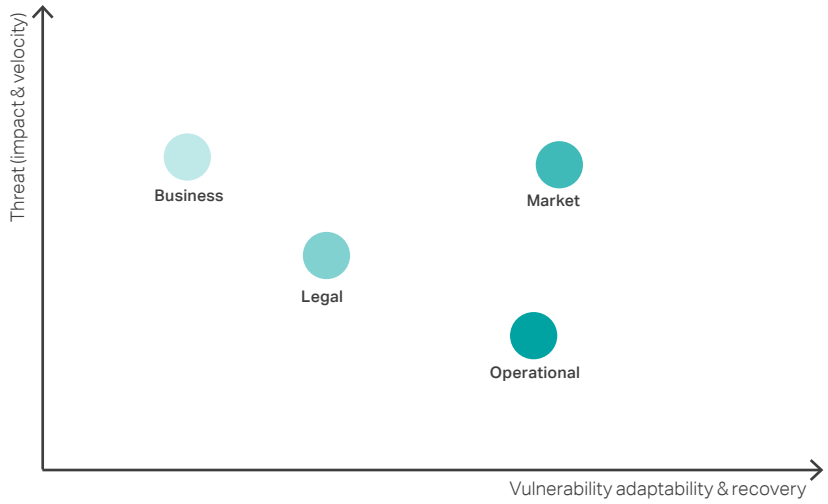
### 3. Prioritization visualization

As a last step, companies can visualize the above-mentioned risk factors in one overview to enable final prioritization. Figure 11 illustrates the threat of a hypothetical company's linear risk (y-axis) versus vulnerability (x-axis).

The graph only shows the main risk categories for demonstration purposes. However, it can be more specific and include all linear risk subcategories, including resource scarcity and changing consumer demands.

This visualization can help prioritize which risk to address first. Based on this prioritization, and in combination with the insights obtained during the analysis phase, companies can plan the roll out and next steps.

**Figure 11:** Plotting the risks




**NOTE | COSO**

The Committee of Sponsoring Organizations of the Treadway Commission (COSO) is a joint initiative bringing together five private sector. It is dedicated to providing thought leadership through the development of frameworks and guidance on enterprise risk management, internal control and fraud deterrence.[23]

Source: www.coso.org

## LINK RESULTS WITH LINEAR RISKS AND CIRCULAR OPPORTUNITIES

In the previous steps, companies identify:

1. Material flows with improvement potential
2. Linear risks and circular opportunities.

Subsequently, companies assess circular solutions that address the prioritized risks and opportunities.

Some recognized circular solutions in this framework are:

### For inflow

- Replace current linear inflow with non-virgin alternatives
- Replace current linear inflow with renewable alternatives
- Reduce resource use through light-weighting of products
- Reduce resource use through use-optimization, digitalization, replacing physical products with services (called "servitization" in some sectors), durability, etc.

### For recovery potential

- Redesign to incorporate modular design, design for disassembly, ensure high recyclability by using mono-materials and/or use biodegradable materials, among others

### For actual recovery

- Increase actual recovery by selling a product as a service or instituting pay per use
- Increase actual recovery through buy-back/take-back schemes
- Increase biodegradable outflow that is consumed

This list is not exhaustive and could grow over time, but it is a good starting point to look at possible solutions to consider. The examples on this and the following page illustrate what some of these solutions could look like.

**EXAMPLE**

**Transition to pay-per-use model**

In the transition from a product sales model to a pay-per-use model, circular material productivity increases as the business model will enable the cycling of products and payment as a service (therefore the linear inflow is going down relative to revenue generated).

**Selling more durable products**

The assumption is that products made at a higher quality are more durable, thus the price per product can increase. Therefore, the relative revenue in relation to linear material use will improve if linear material use remains similar.

**EXAMPLE**

**Replacing virgin inflow by secondary or renewable inflow**

Replacing virgin inflow with secondary inflow or renewable inflow reduces linear inflow mass. If the price of the product remains the same, the performance on the indicator improves.

**Light-weighting a product**

Light-weighting a product should not affect the price of the product and therefore will not impact company revenue. If the material that is removed from the product (partly) consist of linear inflow, the linear inflow will decrease. This results in a higher circular material productivity.

**Digitalization from hardware to software**

If software is additional offered to hardware the absolute revenue grows. The software can provide additional functionality to the hardware or can replace part or all of the hardware. If this is (partly) made from linear inflow, the linear inflow will decrease. This results in higher circular material productivity.

## LEADING INDICATORS FOR CIRCULAR BUSINESS SOLUTIONS

The WBCSD Circular Metrics project team is looking into developing a set of additional leading indicators that can help companies gain insights into their use of these circular solutions.

It is important to realize that these indicators are different from the initial indicator modules in the sense at they are leading indicators not lagging indicators, best illustrated through a simple example.

**EXAMPLE**
**Lagging indicators**

In measuring targets to lose weight, the leading indicators are, for example, how many steps you walk daily or how many calories you consume. The lagging indicator is the weight the scale displays.

The main purpose of these indicators is to monitor and provide insights into the actions the company is taking in its transition to the circular economy. They do not provide insight into the actual success of the solution with respect to the company's overall circularity performance.

Only the shift in the company's % circular inflow and % circular outflow, as calculated in the Close the loop module, can indicate whether the actions the company is taking effectively result in better circular performance.

The first public launch of the CTI framework and the online tool will not include this extra set of indicators. Over the course of 2020, we will work with the wider WBCSD to further develop and test these metrics. If proven usable and useful, we may add them to the process in the framework update targeted for January 2021.

## CIRCULAR OPPORTUNITIES: EVALUATING THE BUSINESS CASE

At this stage in the process, companies have more clarity about:

- The **circular solutions** that can help the company to act
- Its **prioritized risks and opportunities** by applying them
- The **material flows** with improvement potential.

Evaluating the business case can help, either by selecting potential options or by verifying their expected business outcomes. The WBCSD's eight business cases for the circular economy report[24] emphasizes that circular business practices can accelerate growth, enhance competitiveness and mitigate risk. To seize circular opportunities, it is necessary to demonstrate the business case.

In principle, the circular business case is treated like any other business case; but there is potential to overlook some circular business case characteristics if business-as-usual is applied. Therefore, we list some relevant considerations when evaluating the business case for circularity below.

### 1. Evaluate as any other business case

The first step is to assess it like any other business case. If there is already a clear case, there may be no need to demonstrate the circular added value.

### 2. Consider potential cost savings in a circular business case

- Savings can be related to the inflow by replacing linear (virgin non-renewable) by circular inflow (either renewable or non-virgin).
  - **"Cost savings = Costs 100% linear inflow – costs current inflow"**
  - **"Potential cost savings = Costs current inflow – costs 100% circular inflow"**
- Savings can be related to better client retention and acquisition (either by the "green image" or by fostering long-term relationships in product-as-a-service or buy-back/take-back contracts), which can reduce marketing costs.
- Savings can be related to better retention and attraction of talented employees (driven by the "purpose" of circular business).

### 3. Consider increase in revenues

Increase in revenues

- New customers attracted by circularity, convenience and/or sustainability
- New segments because of lower initial investment for a service than a product (pay-per-use model) by clients

### 4. Consider the long(er) term perspective

Product-as-a-service or trade-in offers are based on longer term service contracts or buy-back/take-back offers. Adopting these business models may stabilize profits over time and improve future cash flow predictability.

- By maintaining ownership of the products or regaining access, the company secures future supply and hedges against future resource inflow price volatility.

The societal shift to a circular economy may create future changes in costs savings, profitability and legal requirements (see also the section on scenario planning).

# 7 Apply
## Plan and act

After analyzing the results, prioritizing the risk and opportunities, assessing the circular solutions and defining the business case, the next step is to formulate targets for improvement and execute related actions.

### Formulate targets

Based on the analysis, the potential opportunity for improvement has become apparent. In addition, the prioritize phase has identified the risk and opportunities to address. When combined, this information provides relevant evidence to formulate SMART targets.

### Roll out actions

It is necessary to create actions in order to achieve the targets. Although it is up to the company to further define the specific actions per target, the following is some guidance on elements to consider.

#### Define what needs to happen

The target gives direction on what needs to happen. As described in the analysis section and in the first column of the tables in the next pages, there are high-level examples of possible directions to take. It is up to the company to further formulate specific actions based on the nature of the company and the outcomes of the analysis.

#### Define when it needs to happen

It's recommended to set-up an action plan through back casting. With the time-bound target in mind, companies can roll out intermediate targets and actions based on a roadmap. It is important to define the timelines within the roadmap to ensure the alignment of assessment cycles with the intermediate targets.

#### Define who needs to take action

To ensure action, it is necessary to identify an owner to drive action. The tables below list the possible actions from the analyze phase, with the relevant departments internally, the external parties to consider and considerations to take into account when executing the action.

### Assess the actions and progress on formulated targets

It is important to recognize that this phase is not the final phase of the Circular Transition Indicator framework. As visualized in Figure 12, the process steps follow each other in a cycle and this phase will feed into the scoping phase to start the next assessment and monitor improvement on the targets resulting from the actions executed in the apply phase.

Table 2 provides some additional insights into elements for consideration when planning and rolling out some of the circular solutions as discussed earlier.

**NOTE | SMART targets**

**S**pecific: focus on one element of the indicator at a time (formulate separate targets for the % non-virgin inflow and the % renewable inflow).

**M**easurable: focus on quantitative targets captured within the framework.

**A**mbitious yet achievable: based on the controllability assessed in the planning phase, focus on targets that largely depend on internal factors to ensure achievability.

**R**elevant: focus targets on the most relevant areas based on the analysis (i.e., the largest flows or the most critical materials).

**T**ime-bound: define deadlines for meeting targets and plan the assessment cycle accordingly.

**Figure 12:** The process cycle

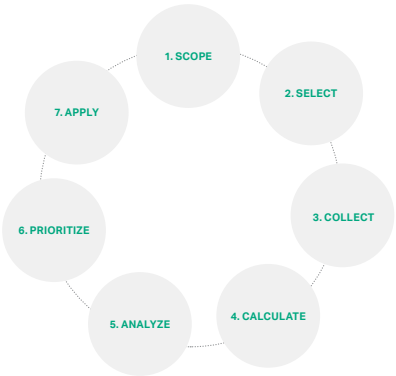


**Table 2:** Elements for consideration when planning and rolling out circular solutions

| Departments to involve | Other parties to consider | Considerations when executing | Example target | Example action |
|---|---|---|---|---|
| **Reduce linear inflow by replacing it with renewable inflow** | | | | |
| Sustainability<br>Procurement<br>Product design<br>Product management<br>R&D | Suppliers | Suppliers | Sustainability and land use<br>Certificates<br>Functionality | Launch a new fashion line on natural materials by 2023 |
| **Reduce linear inflow by replacing it with secondary inflow** | | | | |
| Sustainability<br>Procurement<br>Product design<br>Product management<br>R&D | Suppliers | Sustainability<br>Technical feasibility<br>Acceptance by customer<br>Functionality | Product category X should contain 40% recycled content by 2025 | feasibility and availability with supplier<br>Switch supplier if needed |
| Sustainability<br>Product design<br>Product management<br>R&D | Clients | Functionality<br>Acceptance by the customer | Double the lifetime use of product category X by 2025 | Discuss technical feasibility with design department<br>Research bottlenecks for product use among consumers (i.e., technical limitations, fashion, status, etc.) |
| **Increase recovery potential by optimizing product design (for modularity, disassembly, mono-materials)** | | | | |
| Sustainability<br>Product design<br>Service and maintenance<br>Product management<br>R&D | Clients<br>Suppliers | Technical feasibility<br>Economic viability | 60% of bottles produced consist of mono-materials by 2022<br>20% less in food waste residues by optimizing packaging by 2025 | Change supplier<br>Set up research with supplier |
| **Increase actual recovery by maintaining ownership or buy-back/take-back schemes** | | | | |
| Sustainability<br>Product design<br>Sales<br>Account management<br>Customer relations<br>Service and maintenance<br>Legal<br>Product management | Clients<br>Financiers | Financial implications, e.g., on balance sheet and cash flow<br>Legal implications | 30% of revenues from high value assets should come from pay-per-use models by 2025 | Pilot with a supplier for return logistics<br>Market research to understand client needs and barriers for the new model |
| **Increase actual recovery by setting-up take-back/buy-back or recovery schemes with third parties in the value chain** | | | | |
| Sustainability<br>Product design<br>Sales<br>Account management<br>Customer relations<br>Product Management<br>R&D | Clients<br>Suppliers | Collaboration forms with other parties | Set up a take-back or buy-back scheme for all newly sold phones by 2023 | Set up an agreement with a refurbisher |
| **Increase actual recovery by investing in and advocacy for public schemes** | | | | |
| Sustainability<br>Public relations | Customers<br>Public authorities | Achievable influence and impact | Support public scheme advocacy in 95% of offset markets by 2025 | Join forces with peers on advocacy |

# Glossary

**Biodegradable outflow**
Outflow of material or substance that microorganisms can decompose and that degrades to organic or inorganic molecules that living systems can use further.[25] Follow Organisation for Economic Co-operation and Development (OECD) testing methods for biodegradability.[26]

**By-products**
Unintended but inevitable additional material stream of material processing that is not the intended main product.

**Circular economy principles**

- Design out waste and pollution
- Keep products and materials in use
- Regenerate natural systems

**Circular inflow**
Inflow that is:

- Renewable inflow (see definition) and used at a rate in line with natural cycles of renewability

OR

- Non-virgin.

**Circular outflow**
Outflow that is:

- Designed and treated in a manner that ensures products and materials have a full recovery potential and extend their economic lifetime after their technical lifetime

AND

- Demonstrably recovered.

**Company boundary**

Physical or administrative perimeter of the organization, consistent in scope with financial and sustainable reporting.

**Functional equivalence**
"The state or property of being equivalent" (or equal) in function.[27]

In the context of the CTI, this means that a recovered material can be used for a different purpose from its previous cycle but with a similar function.

For example, plastics used in mobile phones may not be used for mobile phones again; but because properties like strength and cosmetics are equivalent, they can be recycled for kitchen appliances.

**Inflow**
Resources that enter the company, including materials, parts or products (depending on a company's position within the supply chain). Not included are water and energy (carriers), which are part of the specific water and energy indicators.

**Linear inflow**
Virgin, non-renewable resources

**Linear outflow**
Outflow that is not classifiable as circular. This means that the outflow:

- Is not circular in design/ consists of materials treated in a manner that they have no recovery potential

OR

- Neither demonstrably recovered nor flowing back into the economy.

**Linear risk**
The exposure to the effects of linear business practices – use scarce and non-renewable resources, prioritize sales of new products, fail to collaborate and fail to innovate or adapt – which will negatively impact a company's license to operate.[28]

**Non-virgin inflow**
Inflow previously used (secondary) e.g., recycled materials, second-hand products or refurbished parts.

**Outflow**
Material flows that leave the company, including materials, parts, products, by-products and waste streams (depending on a company's position within the supply chain).

**Recovery**
The technically feasible and economically viable recovery of nutrients, compounds, materials, parts, components or even products (depending on the organization) at the same level of functional equivalence through reuse, repair, refurbishment, repurposing, remanufacturing, recycling, composting or biodegrading.

This excludes energy recovery from waste in any shape or form.

**Recovery types**
The different forms of material recovery, such as (in order of the recirculation loops the in the Ellen Macarthur Foundation's Circular Economy System Diagram[29] (or butterfly diagram):

> Reuse | To extend a product's lifetime beyond its intentional designed life span, without changes made to the product or its functionality.

Repair | To extend a product's lifetime by restoring it after breakage or tearing, without changes made to the product or its functionality.[29]

Refurbish | To extend a product's lifetime by large repair, potentially with replacement of parts, without changes made to the product's functionality.

Remanufacture | To disassemble a product to the component level and reassemble (replacing components where necessary) to as-new condition with possible changes made to the functionality of the product.

Recycle | To reduce a product back to its material level, thereby allowing the use of those materials in new products.

Composting | Microbial (bacteria and fungi) breakdown of organic matter in the presence of oxygen to produce soil with high organic (humus) content.

**Regenerative**
"To have the ability to restore material resources and improve ecosystem health to ensure productivity and other benefits (e.g., carbon capture, biodiversity, and other ecosystem services). Note that regeneration goes beyond retaining status quo of natural systems that may already be degraded from their initial state."[30]

**Renewable inflow**
Sustainably managed resources (most often demonstrated by internationally recognized certification schemes) that, after extraction, return to their previous stock levels by natural growth or replenishment processes at a rate in line with use cycles. Therefore, they are replenished/regrown at a faster rate than harvested/extracted.[31]

**Virgin inflow**
Inflow not previously used or consumed (primary).[32]

# References


[1] Based on Circle Economy's 2019 Circularity Gap Report, which states that only 9% of the world's current economy is circular. For more information, see www.circularity-gap.world/.

[2] Based on the WWF Living Planet Report 2012. Available at d2ouvy59p0dg6k.cloudfront.net/downloads/lpr_living_planet_report_2012.pdf.

[3] Based on Circle Economy's and Ecofys's 2016 Implementing Circular Economy Globally Makes Paris Targets Achievable. Available at https://www.circle-economy.com/resources/implementing-circular-economy-globally-makes-paris-targets-achievable.

[4] Government of the Netherlands (2016) A Circular Economy in the Netherlands by 2050. Available at www.government.nl/documents/policy-notes/2016/09/14/a-circular-economy-in-the-netherlands-by-2050.

[5] Circle Economy, PGGM, KPMG, European Bank for Reconstruction and Development (EBRD) and WBCSD (2018). Linear Risks. Available at docs.wbcsd.org/2018/06/linear_risk_report.pdf.

[6] WBCSD (2017). 8 business cases for the circular economy. Available at www.wbcsd.org/Programs/Circular-Economy/Factor-10/Resources/8-Business-Cases-to-the-Circular-Economy.

[7] WBCSD (2018). Circular Metrics Landscape Analysis. Available at https://docs.wbcsd.org/2018/06/Circular_Metrics-Landscape_analysis.pdf.

[8] See https://www.ellenmacarthurfoundation.org/assets/downloads/insight/Circularity-Indicators_Project-Overview_May2015.pdf.

[9] See https://www.circle-economy.com/news/circle-scan-mapping-circular-opportunities.

[10] See https://ecopreneur.eu/circularity-check-landing-page/.

[11] See https://www.ellenmacarthurfoundation.org/resources/apply/measuring-circularity.

[12] Other developments going on at the time of this publication include the ISO Circular Economy Standard (in progress) – www.iso.org/news/ref2402.html; and the UL3600 standard (under development) https://www.ul.com/news/ul-launches-ul-3600-starting-development-process-first-standard-help-companies-evaluate.

[13] Aluminium Stewardship Initiative, at https://aluminium-stewardship.org/about-asi/asi-history/

[14] KPN Circular Manifesto and Appendix 2017 at https://overons.kpn/content/downloads/news/2017-10-11-Circular-Manifesto-and-Appendix-TEMPLATE-V1.0.pdf

[15] See https://naturalcapitalcoalition.org/.

[16] IRENA International Renewable Energy Agency www.irena.org/.

[17] European Commission (n.d.) "Critical raw materials". Available at ec.europa.eu/growth/sectors/raw-materials/specific-interest/critical_en.

[18] United States Geological Survey (USGS) (2018). "Interior Releases 2018's Final List of 35 Minerals Deemed Critical to U.S. National Security and the Economy". Available at www.usgs.gov/news/interior-releases-2018-s-final-list-35-minerals-deemed-critical-us-national-security-and.

[19] See Circle Economy's 2019 Circularity Gap Report at www.circularity-gap.world/.

[20] WBCSD (2018). Linear Risks. Available at: https://www.wbcsd.org/Programs/Circular-Economy/Factor-10/Resources/Linear-Risks.

[21] See www.wbcsd.org/Programs/Circular-Economy/Factor-10/Policy-Engagement

[22] Committee of Sponsoring Organizations of the Treadway Commission (COSO) and WBCSD (2018). Enterprise Risk Management: Applying enterprise risk management to environmental, social and governance-related risks. Available at www.coso.org/Documents/COSO-WBCSD-Release-New-Draft-Guidance-Online-viewing.pdf.

[23] See www.coso.org

[24] WBCSD (2017). 8 business cases for the circular economy. Available at https://www.wbcsd.org/Programs/Circular-Economy/Factor-10/Resources/8-Business-Cases-to-the-Circular-Economy.

[25] This definition is based on the definition from the Cradle to Cradle Products Innovation Institute (2016). Cradle to Cradle Certified – Product Standard. Available at https://www.c2ccertified.org/get-certified/product-certification.

[26] For an overview of the OECD testing methods, refer to Organisation for Economic Co-operation and Development (2017). OECD Guidelines for the Testing of Chemicals, Section 3. Available at https://www.oecd-ilibrary.org/environment/oecd-guidelines-for-the-testing-of-chemicals-section-3-degradation-and-accumulation_2074577x.

[27] Definition from Merriam-Webster at https://www.merriam-webster.com/dictionary/equivalence.

[28] Circle Economy, PGGM, KPMG, European Bank for Reconstruction and Development (EBRD) and WBCSD (2018). Linear Risks. Available at docs.wbcsd.org/2018/06/linear_risk_report.pdf.

[29] See https://www.ellenmacarthurfoundation.org/circular-economy/concept/infographic

[30] Definition from the Ellen MacArthur Foundation.

[31] For example, Forest Stewardship Council (FSC) and Roundtable on Sustainable Palm Oil (RSPO) certifications.

[32] Definition is based on that of the Organisation for Economic Co-operation and Development (OECD). Available at stats.oecd.org/glossary/detail.asp?ID=2290.

## WBCSD CIRCULAR ECONOMY

**Brendan Edgerton** | Director, Circular Economy

**Carolien van Brunschot** | Manager, Circular Economy (project lead)

WBCSD would like to thank the following companies and individuals for providing their insights and collaboration.

**CIRCULAR METRICS PROJECT CHAIR**
**Royal DSM**
Jeff Turner; Roy Vissers; Kimberley Chan

**CIRCULAR METRICS FRAMEWORK DEVELOPMENT PARTNERS**
**KPMG**
Arnoud Walrecht
Suzanne Kuiper (Co-author)

**CTI SOFTWARE DEVELOPMENT PARTNERS**
**Cicular IQ**
Roy Vercoulen
Niels van der Linden

**CIRCULAR METRICS WORKING GROUP MEMBERS**

Caterina Camerani, Wijnand W. Bruinsma, AkzoNobel; Michele Del Grosso, Anna Walker, Wen Zhang; Aptar; Leonardo Guimarães Ribeiro, Alan Knight, ArcelorMittal; Karl Downey, CRH; Lorraine Francourt, Dow Chemical Company; Roy Vissers, Royal DSM; Aysu Katun, Linea Olsson, Greif; Hiroaki Higashitani, Honda; Michael Hershkowitz, IFF; Suzanne Kuiper, Arnoud Walrecht, KPMG; Bertrand Bonhomme, Michelin; Joan Krajewski, Wendy Phippen Microsoft; Robb Truedinger, Daniella Kessler, Novartis; Markus Laubscher, Harald Tepper, Philips; Jan-Willem van den Beukel, Jean-Baptiste Petit, PwC; Björn Aarts, Rabobank; Salil Aurora, Sabic; Krisada Ruangchotevit, Penlada Pisapanit, Poramate Chairat, SCG; Alissa Cotton, Shell; Erica Ocampo, Dhwani Shah, Elise Gautier, Sims Metal Management; Dominique Debecker, Isabelle Gubelmann-Bonneau, Solvay; Roy Antink, Kenneth Collander, Stora Enso; Camille Richard, Jean-Pierre Maugendre, Sebastien Pellion, SUEZ; Amelie Rouvin, Veolia; Roberta Bernasconi, Whirlpool; Andreas Kicherer and Jean-Christoph Lesguilier.

**CIRCULAR METRICS ADVISORY GROUP MEMBERS**

François Saunier, CIRAIG; Michelle Steenmeijer, Circle Economy; Stephanie Connolly, Justin Bourse, Cradle2Cradle Innovation Institute; Jarkko Havas, Ellen MacArthur Foundation; Anna Krotova, Global Reporting Initiative (GRI), Arthur ten Wolde, MVO Nederland; Kari Herlevi, Riikka Leppänen, SITRA; Ke Wang, Platform for Accelerating Circular Economy (PACE).

**CONTRIBUTORS** THROUGH THE CIRCULAR METRICS LANDSCAPE ANALYSIS

Timo van Dun, Vladislava Iovkova, Jean-Baptiste Petit, PwC.

**CONTRIBUTORS** THROUGH PUBLIC CONSULTATION

Adrian Tan, Angel Ramírez, Astrid Wynne, Colienne Regout, Francesca Spadavecchia, John Rincon Moreno, Maija Pohjakallio, Marie-Caroline Spallart, Mark Phillips, Michael Scharpf, Tamara Veldboer, Vladimir Guzman Contreras and many others.

**CONTRIBUTORS** THROUGH REVIEWING AND PILOT TESTING AND BETA TESTING

Arcadis, ArcelorMittal, CRH, Royal DSM, International Flavors & Fragrances Inc., Imerys, KPN, Nederlandse Spoorwegen, Philips, Phoenix Global DMCC, SCG, Sims Metal Management, Stora Enso, SUEZ, Umicore, Veolia, Votorantim Cimentos, Whirlpool, World Economic Forum.

## ABOUT FACTOR10

The future of business is circular and there is no room for waste in it. Factor10, WBCSD's circular economy program, aims to bring circularity into the heart of business leadership and practice. Our goal is to build a critical mass of engagement within and across business to move the circular economy to deliver and scale solutions needed to build a sustainable world.
To reach Vision 2050, in which not a particle of waste exists, eco-efficiency of materials must improve by a factor of 10. The Factor10 Institute previously referenced this target in 1994 when it called for a ten-fold improvement in resource efficiency. Learn more about Factor10 at https://www.wbcsd.org/Programs/Energy-Circular-Economy/Factor-10.

## ABOUT WBCSD

WBCSD is a global, CEO-led organization of over 200 leading businesses working together to accelerate the transition to a sustainable world. We help make our member companies more successful and sustainable by focusing on the maximum positive impact for shareholders, the environment and societies. Our member companies come from all business sectors and all major economies, representing a combined revenue of more than USD $8.5 trillion and 19 million employees. Our Global Network of almost 70 national business councils gives our members unparalleled reach across the globe. WBCSD is uniquely positioned to work with member companies along and across value chains to deliver impactful business solutions to the most challenging sustainability issues. Together, we are the leading voice of business for sustainability: united by our vision of a world where more than nine billion people are all living well and within the boundaries of our planet, by 2050.

Follow us on LinkedIn and Twitter

www.wbcsd.org

## DISCLAIMER

This report is released in the name of WBCSD. Like other reports, it is the result of collaborative efforts by WBCSD staff and experts from member companies. Factor10 Circular Metrics work stream participants reviewed drafts, ensuring that the document broadly represents the majority of Factor10 members. It does not mean, however, that every member company of WBCSD agrees with every word. Please note that the data published in the report are as of January 2020.

**World Business Council**
**for Sustainable Development**

Maison de la Paix
Chemin Eugène-Rigot 2B
CP 2075, 1211 Geneva 1
Switzerland
www.wbcsd.org