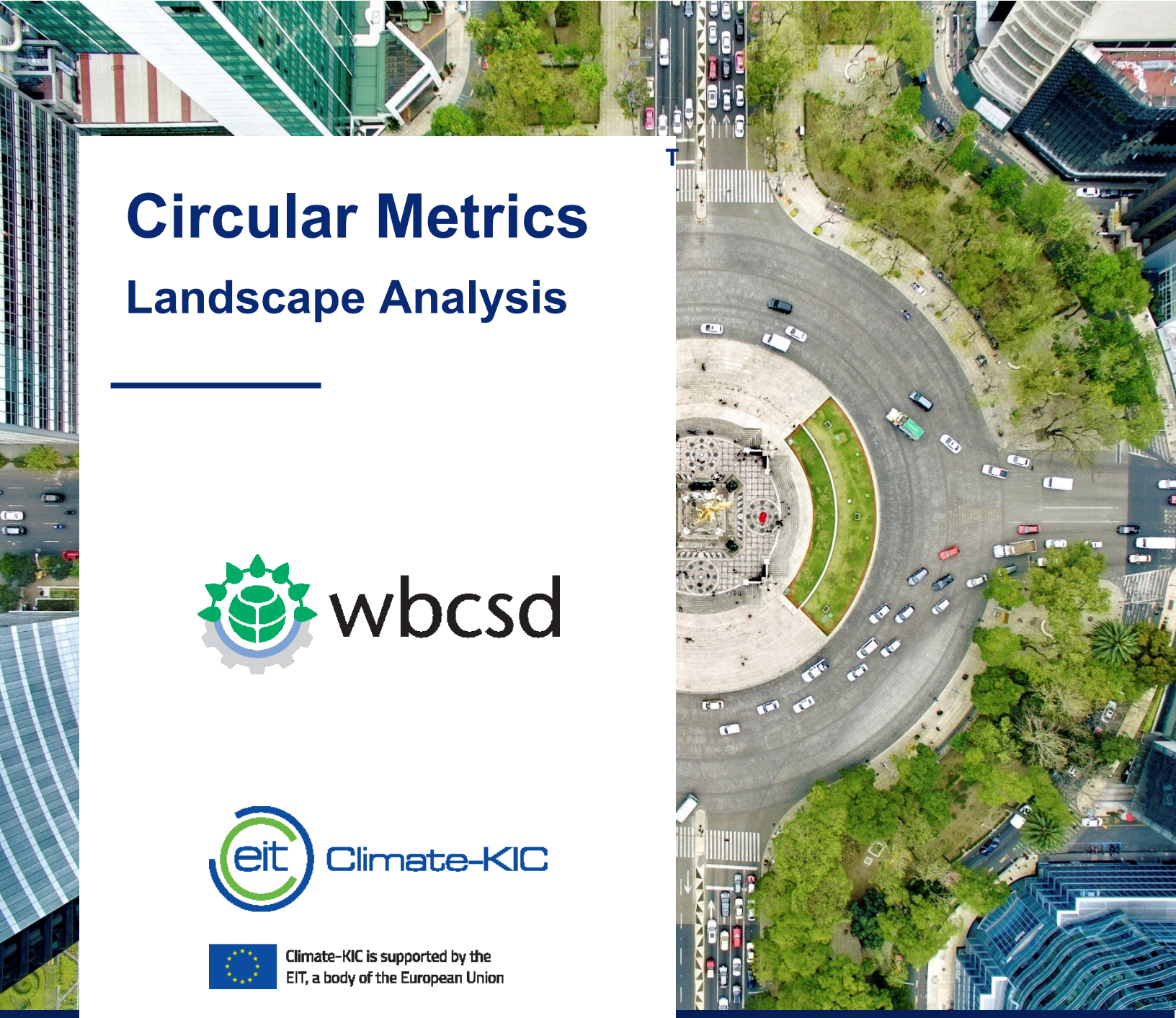


Circular Metrics

Landscape Analysis

wbcsd

eit Climate-KIC

Climate-KIC is supported by the EIT, a body of the European Union

MAY 2018

A joint report on the current landscape of circular metrics use and recommendations for a common measurement framework

This activity has received funding from the European Institute of Innovation and Technology (EIT) under grant agreement No TC2018A_2.1.4-CirMet_P308-1A. This European body receives support from the Horizon 2020 research and innovation programme.

Executive summary

Background

The circular economy conversation has taken off in the last few years. With its recent proliferation came the adoption of unique definitions, frameworks and ways of measuring it around the world. Measuring progress in the circular economy is challenging and what and how adopters of circular economy practices decide to measure it depends a lot on their objective, scope and audiences. 74% of interviewees indicated that their company use their own framework for measuring circularity. Therefore, the cacophony of circular metrics popping up across sectors and geographies has created an environment of competing and often conflicting indications of actual circularity progress achieved.

This report aims at understanding the current landscape of circular metrics globally. It constitutes the first phase of WBCSD's Metrics and Measurement workstream which final aim is to achieve harmony in how individual companies measure their progress in the circular economy. This workstream is part of WBCSD's Factor10 program on the circular economy.

Circular metrics in business – key findings

- **Scope:** The scope of the circular economy was inconsistent across interviewees, with one exception: all respondents mentioned "materials" as a part of the circular economy. Interviewees frequently referenced "water" and "energy" but not unanimously.
- **Level of measurement**: **76%** of respondents are evaluating their circularity at the micro or company level.
- **Value chain and life cycle factors:** **48%** of the circular metrics identified relate to the internal operations or processes of a business. **22%** and **20%** of the circular metrics analyzed qualify under the **Raw Materials** and **End of Life** phases of the life cycle, respectively. Companies rarely use **Design, Distribution** and **Use** phase indicators.

Based on the 39 interviews conducted, the key intended audiences and reasons for measuring circularity were identified.

Why are businesses measuring circularity?

1. Drive business performance or strategy
2. Justify achievement externally
3. Integrate circularity across the business
4. Manage risks associated with the existing linear business model
5. Know the impact of their circular activities

Who are the intended audiences?

1. Top management
2. Customers
3. Employees
4. Investors
5. Regulators
6. Reporting bodies
7. Suppliers
8. NGOs

Measuring circularity outside of the private sector

The private sector is not the only actor interested in measuring its progress against circular economy. Governments are adopting circular economy roadmaps and action plans with metrics and indicators in them. Non-governmental organizations have established their own metrics and certification schemes related to circularity. Lastly, there have been numerous studies published out of academia on how to measure circularity and its associated impacts. The consistency in the metrics and methodologies to each of these approaches rarely overlap or complement one another.

Challenges and enablers for developing a common framework to measuring circularity

Challenges

- Storytelling and effective communication of circular initiatives
- Accounting for environmental, social and economic impacts of circularity
- No consensus on the definition of the circular economy
- Data availability
- Internal management & culture change

Enablers

- A common framework to understand and communicate about the circular economy
- Regulators and policy makers
- Internal management
- Success stories through the framework
- Inclusion of academic institutions to ensure credibility and rigor

Looking forward to the development of a common framework for measuring circularity at the company level, the Circular Metrics working group should consider the following recommendations:

7 Recommendations for a framework to measuring circularity

1. Drive circular business performance
2. Target specific audiences depending on company objectives
3. Cover a comprehensive sustainability scope
4. Ensure flexibility and inclusion
5. Adopt a phased approach to incorporating capitals
6. Build upon existing frameworks and standards
7. Drive culture change and provide guidance

Contents

Introduction

A circular economy calls for the decoupling of economic growth and resource consumption. Evolving over decades from multiple schools of thought such as industrial ecology and biomimicry (among others) the circular economy conversation has taken off in the last few years. With its recent proliferation came the adoption of unique definitions, frameworks and ways of measuring it around the world.

Measuring progress in the circular economy is challenging. What and how a company, organization or government chooses to its contributions towards a circular economy depends on its objectives, scope and intended audiences. Even within the private sector, the indicators, methodologies and target audiences for circular metrics vary greatly. The cacophony of circular metrics popping up across sectors and geographies has created an environment of competing and often conflicting indications of actual circularity progress achieved.

As part of WBCSD's circular economy program, Factor10, the Circular Metrics workstream aims to achieve harmony in how individual companies measure their progress in the circular economy. This report concludes the first phase of the Circular Metrics workstream, aiming to understand the current landscape of circular metrics globally. Based on the findings and recommendations, the workstream working group will begin development of a consensus-based framework for how to measure circularity at the company level. This second phase will begin in the second quarter of 2018.

PwC provided technical and strategic support for the circular economy metrics landscape for WBCSD only and solely for the purpose and on the terms agreed with WBCSD in relation to its engagement letter dated 8 May 2018. PwC accepts no liability (including for negligence) to anyone else in connection with this content.

Methodology

WBCSD and PwC conducted the circular metrics landscape analysis between November 2017 and April 2018. The information and data collection for the process included 39 company interviews (including 18 Factor10 members), 8 additional interviews with NGOs, governments and academia and review of 140 annual reports and 25 other relevant sources. The span of the research covered 15 sectors and five continents. The graphic above shows the geographic spread of the interviews and annual reports reviewed, based on company headquarters (despite most operating globally). The global span of the analysis was subject to identifying companies that were both active in practicing the circular economy and willing to share their experiences. As such, most of the interviewees worked for companies headquartered in Europe.

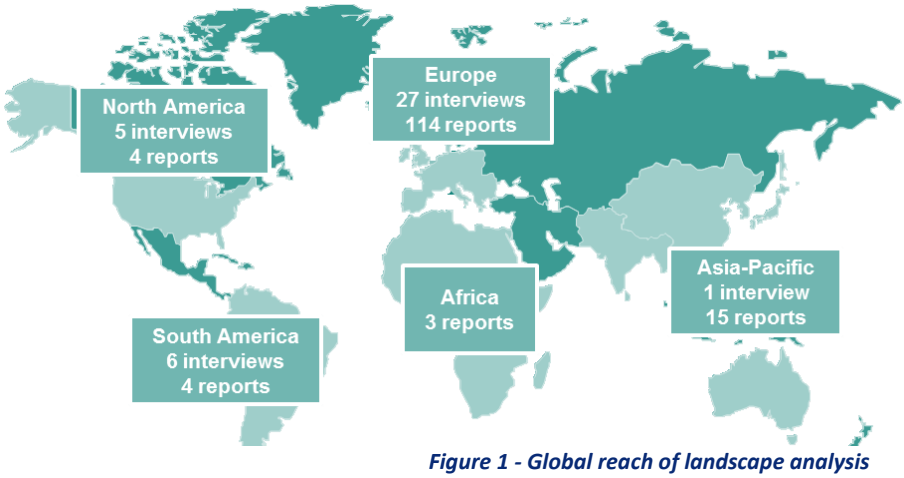
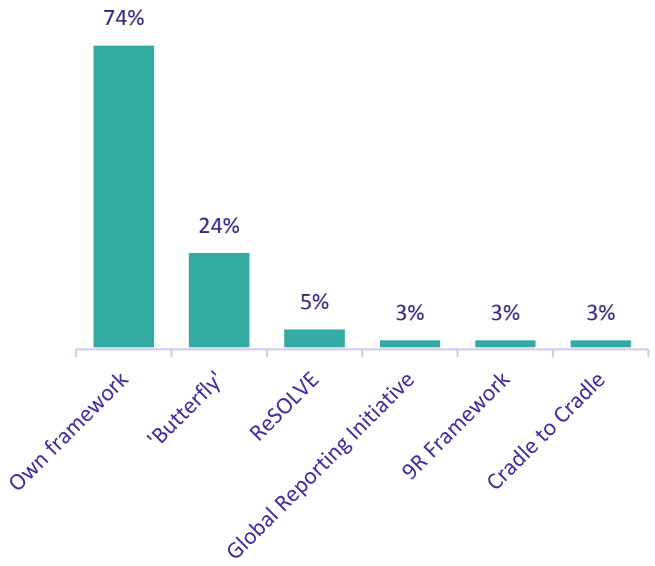


Figure 1 - Global reach of landscape analysis

The value for business in measuring circularity

Figure 2 - CE frameworks cited



Companies are already measuring how their circular initiatives are creating financial value. They are finding circular processes and products can reduce costs, enhance customer and employee relationships, differentiate from competition and spur innovation. However, the circular economy represents something a bit different to each company across geographies and industries.

Most companies have their own definition of the circular economy. In fact, 74% of interviewees indicated that their company had their own framework for measuring circularity. The next most referenced circular economy framework was Ellen MacArthur Foundation's "butterfly diagram" at 24%. Interviewees rarely referenced other frameworks, such as McKinsey's ReSOLVE, Cradle to Cradle and the 9R framework. The graph above highlights the percentages of the frameworks referenced by each of the 39 interviewees.

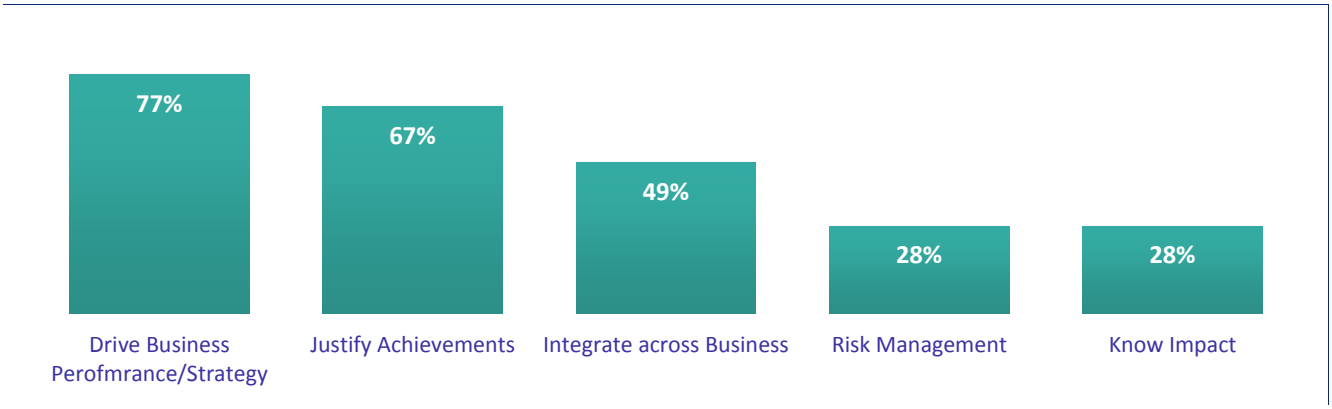
This indicates that because the circular economy as a concept is relatively vague and amorphous, companies are shaping and framing the concept based on how it is most material to their core business. The number of unique frameworks and definitions on the circular economy will present a challenge to creating a consensus-based framework for measuring circularity in the next phase.

Based on the 39 company interviews, **there are five main reasons why businesses are interested in measuring their circularity**:

1. Drive business performance or strategy
2. Justify achievements externally
3. Integrate circularity across the business
4. Manage risk associated with the existing linear business model
5. Know the impact of their circular activities

The chart on the next page demonstrates the percentages of respondents that referenced that driver as a reason for measuring circularity. Thus, the numbers do not sum up to 100%.

Figure 3 - Reasons for measuring circularity



DRIVE BUSINESS PERFORMANCE OR STRATEGY: The most referenced reason (77% of interviewees) for measuring circularity in business is driving business performance or strategy. Companies increasingly see the circular economy as a value driver, recognizing the financial opportunity in reevaluating the business model. This is found in companies with advanced maturity in circularity. To achieve this, a business must not only incorporate circularity into their sustainability strategy but also their corporate strategy. In a couple of companies interviewed, executive compensation is tied to circular metrics; highlighting the investment that businesses are taking towards circularity.

JUSTIFY ACHIEVEMENTS EXTERNALLY: 67% of interviewees cited the importance of justifying circular achievements externally as a reason for measuring circularity. Company representatives mentioned the need to credibly and consistently disclose or report on circular initiatives to relevant stakeholders, including (in order of highest to lowest importance): customers, investors, regulators, reporting bodies, suppliers and NGOs. Companies are using circular metrics to communicate to their customers.

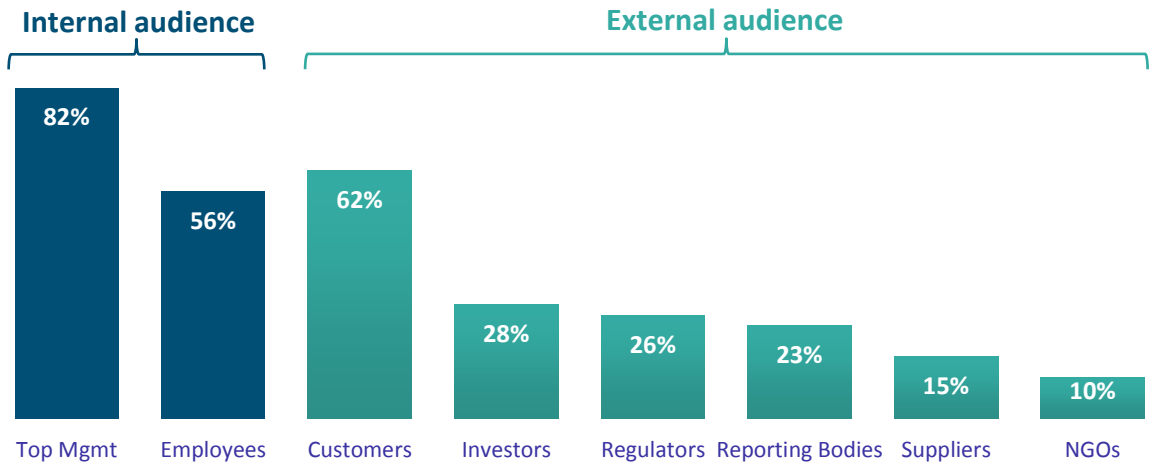


Figure 4 - Target audience of CE metrics

INTEGRATE CIRCULARITY ACROSS THE BUSINESS: 49% of interviewees cited the need to integrate circularity across the company as a reason for adopting circular metrics. To effectively integrate circular economy principles into a company's mission or strategy, it must incorporate those elements into its operations and performance management systems. To get a company's business units to buy into a shift towards circularity, the metrics and goals should be applicable to teams and individuals and foster improvement over time. Businesses have found that using circular metrics can change products and processes over time, creating real financial value for the organization overall. In fact, a recent WBCSD/ BCG study found that 97% of survey respondents indicated that the circular economy drove innovation and made the company more efficient and competitive. 51% stated that the circular economy activities already add to company profits.

MANAGE RISK ASSOCIATED WITH THE EXISTING LINEAR BUSINESS MODEL: A report published by the WBCSD in 2017 found that approximately 20% of respondents stated that risk management was a driver for their company adopting circular business models. Our interview process resulted in a similar 28% indicating that risk management was a reason their company is interested in measuring circular performance. Examples of "linear" risks that companies aim to mitigate include commodity price volatility, resource supply security, brand value and reputation and business continuity.

KNOW THE IMPACT OF THEIR CIRCULAR ACTIVITIES: One of the surprising results of the landscape analysis was that only 28% of company representatives indicated that they measured their circular performance to understand the broader impacts of their circular activities (e.g. environmental and social). This highlights the primary focus business has on the financial opportunities of the circular economy, with environmental and social opportunities taking a more secondary role as drivers. Acknowledging that not all circular solutions have net positive environmental and social impacts, it will be important to ensure that the incentives that a circular framework establishes does not come at the cost of natural, social or human capital.

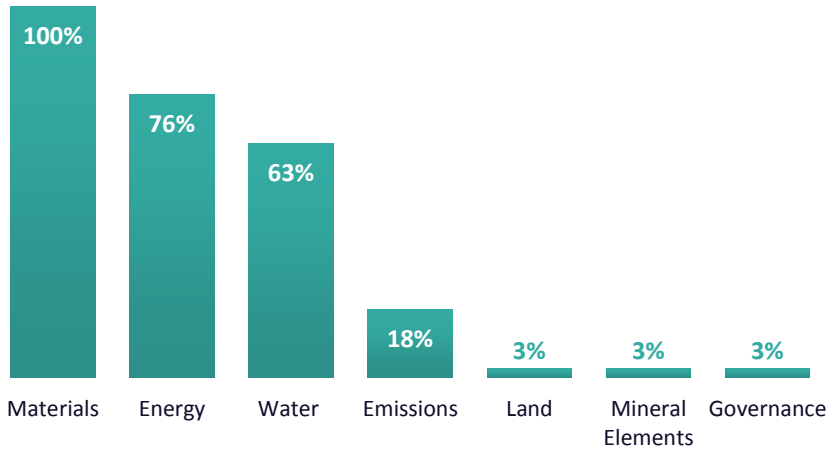
Circular metrics in business

As mentioned in the previous section, most companies have their own definition and framework of how they understand the circular economy. Consequently, the metrics and scope of those metrics that they adopt also varies.

Scope

The scope of the circular economy was not consistent across interviewees, with one exception: materials. Interviewees always cited materials as an element that a circular measurement framework should include. Energy (76% of interviewees) and water (63%) were typically referenced but not unanimously. Almost half of interviewees stated that their company includes materials, energy and water within the scope of the circular economy. Other elements that companies mentioned are included in their circular metrics include emissions, land, mineral elements and governance, but much less so.

Figure 5 - CE metric elements (in scope)



It's important to note how a company's sector or position in the value chain impacts what and how it measures its contributions towards a circular economy. For example, a chemical company may not only be interested in how its own operations are circular but also know how their products enable products down the value chain to achieve circularity. This is a drastically different reason to measuring circularity that an investor may take, prioritizing the circularity of a portfolio based on financial, environment and governance metrics of each portfolio company.

Consider the following anecdotal examples of how the key metric can vary across industries. These indicators are neither comprehensive nor consistent across all industry players. The main message is to note the diversity in priorities that a common framework would have to resolve.

Table 1 - Sector priorities

Each sector may ask: what is our key unlocking move to a circular economy? For example:			
Agriculture	Soil fertility (improve)	Healthcare	Hazardous waste (reduce)
Construction	Virgin materials (reduce)	Manufacturing	Close loop (ensure)
Waste management	Down-cycling (minimize)	Mining	Urban mining (leverage)
Financial services	Circularity of portfolio (increase)	Transport & Logistics	Fleet use and lifetime (maximise)

Levels of measurement

As circular economy is a broad concept, it includes several stakeholders. These stakeholders have different roles in the economy and society and so have different objectives. When working on circular economy, it is relevant to identify different goals and related action plans according to which stakeholder we are (i.e. which level of analysis is appropriate):

- Macro: this is the highest level where cities, countries and international agencies reside
- Meso: it represents all inter-industries and inter-firm networks
- Micro: this is the level where companies and consumers stand
- Nano: this is the lowest level of analysis possible at which stand products and components. Not all researches and publications include this level as the related goals and actions must be taken by the higher level

Table 2 - Levels of circular metrics

	What does CE mean?	What are CE's positive impacts?
Macro (countries, cities …)	• Change **purchasing habits** (favor products & services with low environmental impact…) • **Enforce laws, programs, frameworks** related to CE	• Increase attractiveness thanks to **value / job creations** • **Limit resources rarefaction and dependency** on importations
Meso (inter-industries…)	• Create inter-industries/firms networks • Deploy **industrial symbiosis** where companies exchange flows and mutualize needs	• Increase **dynamism & attractiveness of territories** • Reduce impact on environment • **Create / relocate jobs**
Micro (companies, consumers)	• **Consume green** (favor products with low environmental impact, recycling…) • **Produce cleaner** (eco-conception, offer services instead of products…)	• **Reduce impact on environment** • Provide **competitive advantage** (improved business model, new markets available…) • **Improve brand image** / reputation
Nano (product, component…)	• Use / extract **environmental-friendly goods** • **Increase life expectancy** of goods through recycling, reuse, repairing	• **Decrease extraction / consumption** of raw materials • **Increase value of second-use materials** and goods

Within the private sector specifically, circular metrics take on three levels: *nano, micro* and *meso*. Each one is comprised of a series of the level beneath it. Table 3 details the scope of each level and lists a few industries that level may apply to.

Table 3 - Circular metric levels in the private sector

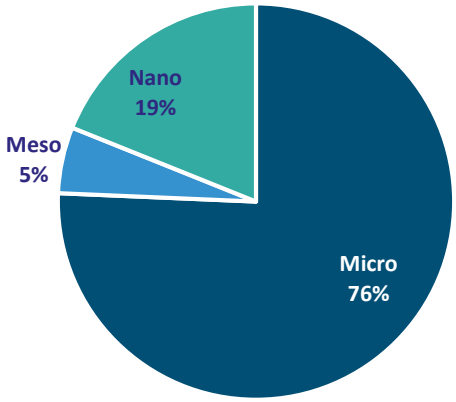
Level	Scope	Industries
Nano	Resource, component, product or process	Agriculture, Construction, Manufacturing, Utilities, Technology, Chemicals, Automotive, Retail
Micro	Company portfolio of *Nano* level or company input-output analysis	
Meso	Company portfolio of *Micro* level	Finance, Real Estate

A company may measure circularity at more than one level. For example, a widget company may measure the circularity of each widget type and then aggregate the types at the company level to understand how its portfolio performs overall. Further, an investor may want to understand the circularity of its investment portfolio by aggregating each company's individual circular performance within it.

The results of the interview process revealed that most companies are evaluating their circularity at the Micro or company level (76%). This may be done by either aggregating product or service totals or calculating the resource inputs and outputs of the entire company.

19% of interviewees stated that they measure the circularity of their products or services (Nano level). 5% of those survey indicated that they measure the company's circularity at the Meso level. This means that they evaluate the circularity of their portfolio, which consists of multiple companies or Micro entities.

Figure 6 - Results of circular metric levels cited



Value chain and life cycle factors

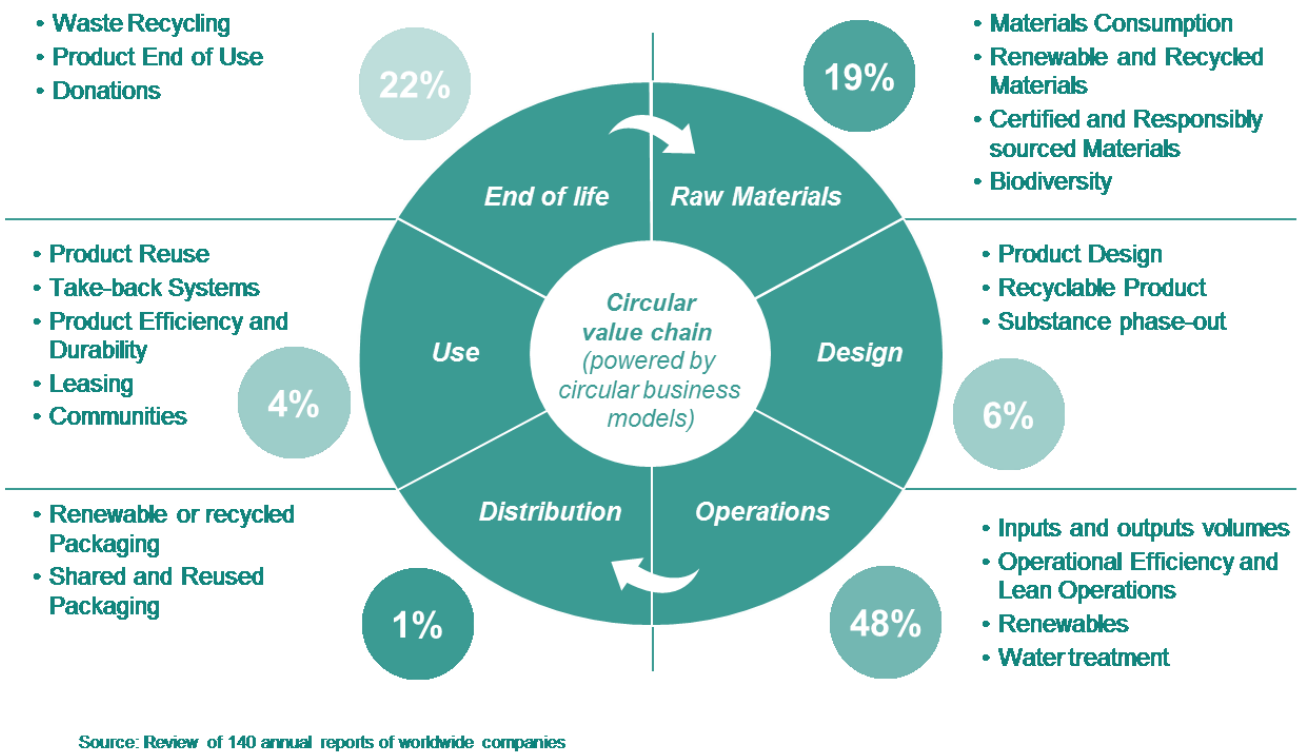
In addition to resolving the scope and level differences in circular metrics, a common framework for measuring circularity at the company level will need to resolve the nuances caused by the position in the value chain or life cycle.

The graphic below highlights both how circular metrics (both internal and external) can vary along the life cycle (or value chain) as well as the relative proportions of the metrics that are in use today. There are a couple of noteworthy findings here:

- 48% of the circular metrics identified relate to the internal operations or processes of a business. Examples of such metrics include "relative" resource efficiency (i.e. energy efficiency or energy consumption per unit) indicators or "absolute" indicators (i.e. renewable energy consumed). Given the alignment of these types of metrics with regular operational performance metrics, it's unsurprising that these appear the most frequently in the analysis.

- 22% and 20% of the circular metrics analyzed qualify under the **Raw Materials** and **End of Life** phases of the life cycle, respectively. Indicators such as materials consumption, recycled content and hazardous materials are common Raw Materials indicators. Waste diverted from landfill, tons recycled and product volumes taken-back are typical examples of End of Life indicators.
- **Design, Distribution** and **Use** phase indicators are rarely used (6%, 1% & 4% respectively). These indicators require the company to integrate more advanced levels of life cycle thinking into their performance management and reporting systems.

Figure 7 - Circular metrics along the life cycle

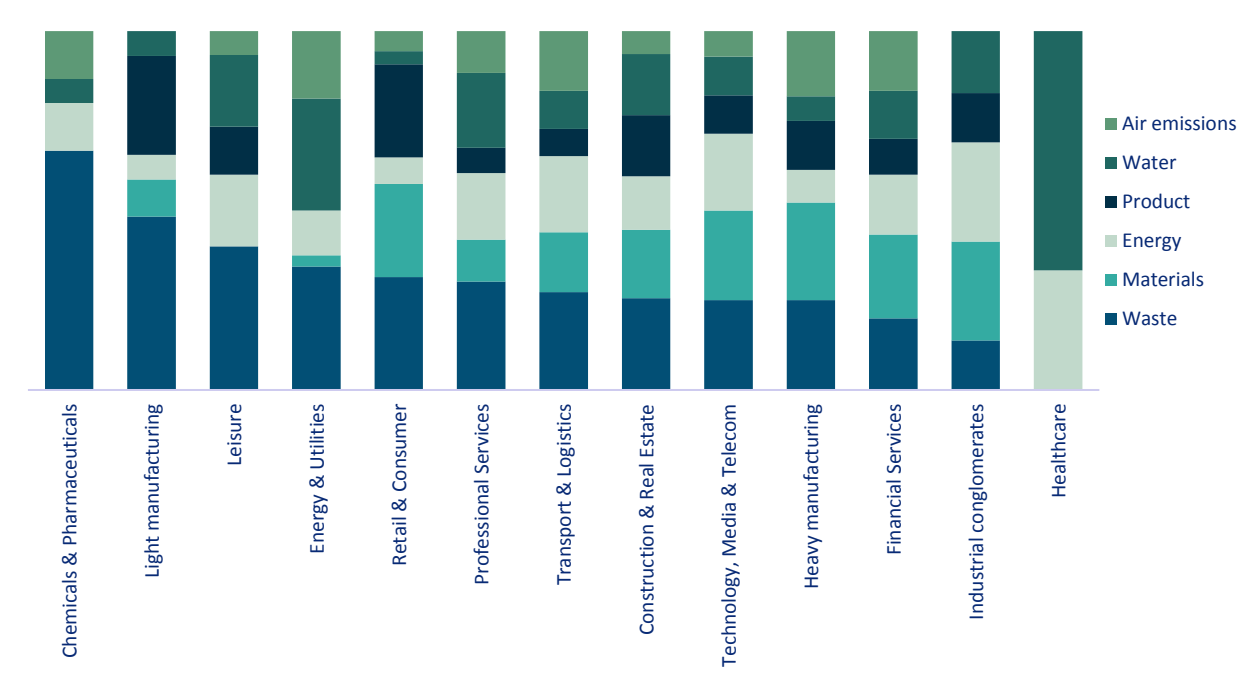


Source: Review of 140 annual reports of worldwide companies

Industry factors

The graph below again illustrates the use of different environmentally-focused indicators disclosed in annual reports, depending on a company's industry. Although based on a small sample, it's clear that indicators depend on the materiality of the environmental issue to that company, industry and geography. For example, water efficiency indicators are likely to be more material to an Indian chemical company than they may be to a British financial services company. This suggests that a framework for measuring circularity should recognize the relative criticality of some metrics over others, depending on industrial or geographical contexts.

Figure 8 – Environmental indicator types by industry. Source: Review of 140 annual reports of worldwide companies



Evolving metrics on the circular economy

Companies are at different stages of maturity with respect to their ambitions in the circular economy. Many are beginning their circular journey by weaving a circular economy narrative into their current operations. A smaller portion is integrating circular thinking into their sustainability strategy, taking a more ambitious step in their circular journey. Few companies have reevaluated their corporate strategy to base it on circular principles.

Table 4 - Circular metric phases

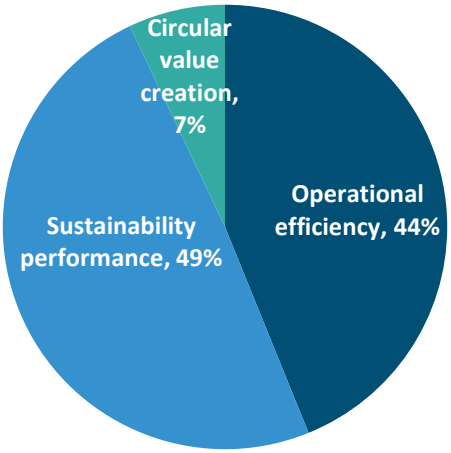
	Beginner	**Intermediate**	**Advanced**
Circular Strategy Ambition	Circularity not formally recognized	Circularity integrated in *sustainability strategy*	Circularity integrated in *corporate strategy*
Circular Metrics	Operational Efficiency	Sustainability Performance	Circular Value Creation

Given this evolution, there is a trend for companies to adopt *operational efficiency* and *sustainability reporting* indicators prior to *circular value creation* indicators. Recognizing the differences in how companies define and communicate about the circular economy, the "circular" metrics disclosed by companies can be broken into these three categories:

- *Operational efficiency metrics* are often standard performance metrics that may be tracked even before a corporate sustainability program is adopted. Examples include resource efficiency, energy consumption, water and waste.

- *Sustainability performance metrics* take it a step further by looking at some of the environmental endpoint and social impacts of company activities and products. Example metrics include greenhouse gas emissions, local stakeholders engaged or biodiversity impact.
- *Circular value creation metrics* track how the business is improving through circularity initiatives. Example metrics include circular revenue, circular percentage of portfolio and preserved value.

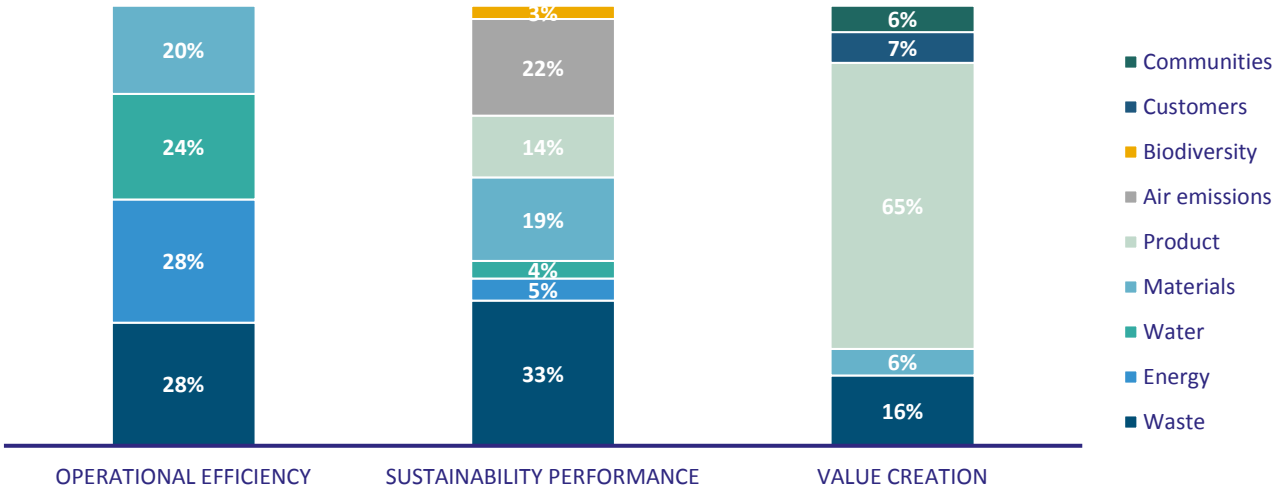
Figure 9 - Breakdown of circular metrics identified



Although not a representative sample of the broader business community, the chart adjacent indicates the types of "circular" metrics that companies analyzed. This data is based on the 140 sustainability reports analyzed. Circular metrics were only counted if the company referenced that metric in the context of the "circular economy".

"Intermediate" companies with a sustainability focus use a broad range of metrics, richer than that of the "Beginner" companies focusing on operational efficiency only. In the next phase of circular ambitions, companies with a value-creation focus tend to adopt a focus on product-related metrics in addition to internal performance KPIs. Consequently, the scope of their metrics is larger and involves other stakeholders more directly. The chart below highlights how metric types change as a company advances in their circular thinking.

Figure 10 - Circular metric types by company maturity



The table below provides more details of how circular-related metrics can change as a company moves from operational efficiency aspirations to value creation ones. The table below is not comprehensive and is meant to be more demonstrative.

Table 5 - Sample circular metrics by category

	Operational Efficiency	Sustainability Performance	Circular Value Creation
Environmental	• Energy efficiency • Water efficiency • Material efficiency	• Recycled content • Circular projects • Waste diverted from landfill	• Valorization of residues • Preserved value • EP&L intensity
Social	• Labor hours per unit • Productivity level • Supply chain transparency	• Local stakeholders engaged • Customers reached • # of Accidents or Incidents	• Jobs created (direct and indirect) • Social enterprises started • Total economic contribution
Financial	• Energy cost per unit • Price per resource unit • Landfill tipping fees	• Carbon credits • Circular procurement • Resource cost savings	• Circular revenue • Circular percentage of portfolio • Remanufactured goods sold

Measuring circularity outside of the private sector

Since early 2010s, initiatives have been launched at a higher speed at all levels. First, states have developed the concept and adapted it to the challenges they faced. China and Japan first promoted Circular Economy by implemented dedicated laws.

Since then, countries all around the world – and in particular the European Union – have launched programs aimed at preserving resources, promoting reuse and recycling and using digital technologies to create sustainable value.

Public sector-driven initiatives and frameworks can impact circularity measurement at company level in two ways. At a more basic level, by creating awareness on the topic and providing macro-level guidelines and roadmap (e.g. the recently published roadmap on Circular Economy of the French State).

At a more advanced level, States or supranational unions like the European Commission can actively establish reporting guidelines and measurement principles that companies will have to comply with. Regulations can either set principles and rules, or rather provide incentives; the latter approach is chosen for instance while organizing ERP (Extended Producer Responsibility) schemes: by setting financial incentives related to a % of recycled material content, an ERP scheme can indirectly create an incentive for private companies to measure such KPI and take operational decisions on how to maximize its value.

Besides public sector-driven initiatives, other bodies such as NGOs or academia can also contribute to the debate on Circular Measurement by proposing frameworks and approaches the private sector can actively collaborate on or at least consider while setting own standards.

NGOs & Academia

Several frameworks have been created and can be used by any stakeholders to measure the performance of their projects. As there are multiple frameworks used all around the world, we have decided to highlight 4 major ones:

- The **Material Circularity Indicator** (MCI): it calculates the quantity and intensity of circulation at product and/or company levels (circular and restorative flows). The tool also allows to compare your performance with your industry's average

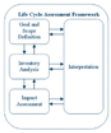
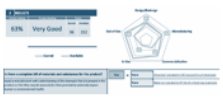
- The **Life Cycle Assessment** (LCA): it is not a tool dedicated to Circular Economy. It helps evaluating the environmental or social impacts of a product system at each step of its life cycle (from raw material extraction to end of use). Once measured, it provides insights of how to minimize the natural and social capital impacts

- The **Circular Economy Toolkit** (CET): it identifies and assess the potential improvement of products' circularity. As for the tools above, it also provides recommendations of improvement on each step of the life cycle

- The **Circular Economy Indicator Prototype** (CEIP): it evaluates a product circularity performance in the context of Circular Economy. The CEIP gives an overall score (%) and a radar diagram with performance of each life cycle step

The table on the next page provides more details into each of these circular measurement frameworks.

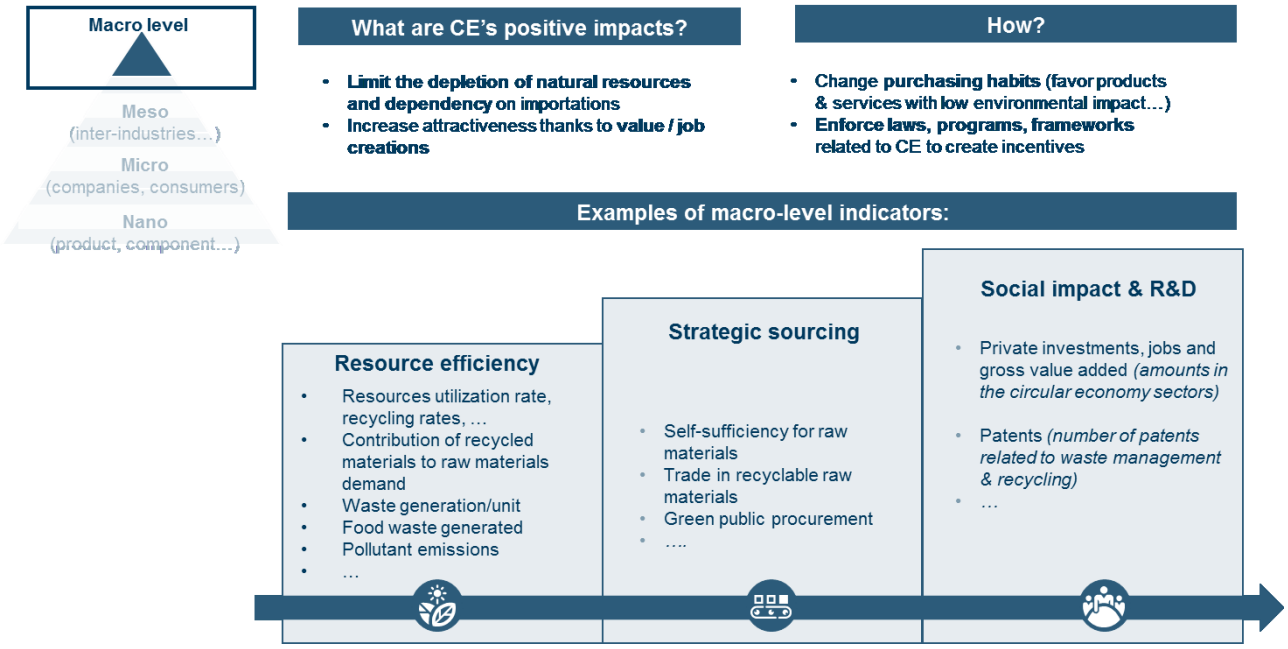
Table 6 - Circular measurement frameworks

	What information does it provide?	What does it look like?	What inputs does it require?
The Material Circularity Indicator (MCI)	• **Quantity and intensity of circulation** (circular and restorative flows) at product and/or company levels • **Comparison of performance** with the industry average	 MCI = 0.50	• Bill of Material • Recycled / reuse components and materials at end of use • Recycling efficiency • Duration and intensity of use
The Life Cycle Assessment (LCA)	• **Evaluation of the environmental impacts** of a product system at each step of its life cycle (from raw material extraction to recycling) • Recommendations to minimize the impact		• Processes of a product system during its whole life cycle • Material & energy inputs for each step • Waste outputs for each step
The Circular Economy Toolkit (CET)	• Identification and assessment **of potential improvement of products' circularity** • **Recommendations** of improvement for each step of the life cycle		• Answers to 33 questions linked to the steps of the life cycle from design to recycling
The Circular Economy Indicator Prototype (CEIP)	• **Evaluation of a product circularity performance** in the context of circular economy • Overall score (%) and a radar diagram with performance of each life cycle step		• Answers to 15 questions linked to the steps of the life cycle from to end-of-life

Governments

Governments, both national and municipal, typically adopt circular metrics at the macro level. Their aims of such policies may drive improved performance in resource consumption, economic development, environmental stewardship and/or job growth. Policymakers have a critical role in accelerating circular economy uptake. Typical policy levers used in stimulating circular economy activities include public procurement, taxes (i.e. landfill tipping fees) and incentives (i.e. end of life return schemes). The table below provides some examples of government indicators identified.

Table 7 - Summary of CE metrics in government



This section provides some detail on select circular economy policies from around the world and discusses how it relates to the metrics conversations in the private sector. This is not an exhaustive list of national circular economy policies but a sample snapshot of these initiatives globally.

China, Japan and the European Union were some of the first national governments to adopt circular economy policies. Since then, other nations, researchers and companies have understood the importance of circular economy and have launched national roadmaps or similar circular economy development policies.

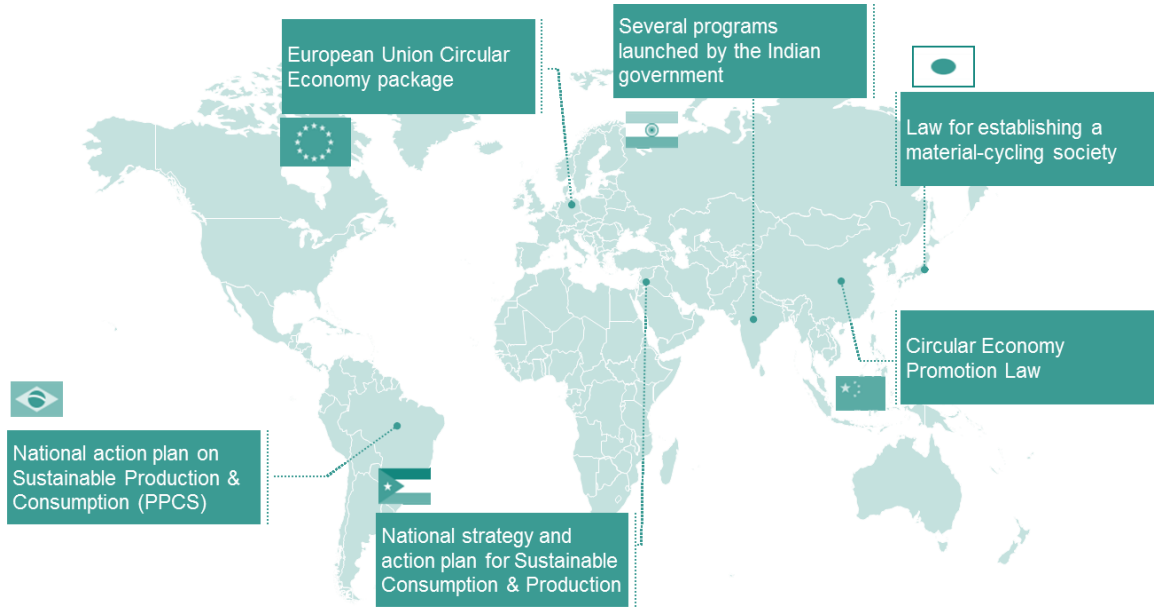


Figure 11 - Global snapshot of select CE policies

European Union

The objective of the European Commission is to transform the economy and make it more sustainable. To do so, these metrics are tightly followed to measure the progress made and the remaining efforts to be done. The European Commission built up a set of 10 indicators based on the stages of the lifecycle of resources, products & services:

- EU self-sufficiency for raw material *(% key materials used in EU that are produced within EU)*
- Green public procurement *(% major public procurements that include environmental requirements)*
- Waste generation *(waste generation per capita / per GDP unit)*
- Food waste *(amount generated)*
- Overall recycling rates *(% municipal waste)*
- Recycling rates of specific waste streams *(% overall packaging waste / electronic equipment / bio waste…)*
- Contribution of recycled materials to raw materials demand *(% secondary raw material on overall raw material demand)*
- Trade in recyclable raw materials *(imports & exports of selected recyclable raw materials)*
- Private investments, jobs and gross value added *(amounts in the circular economy sectors)*
- Patents *(number of patents related to waste management & recycling)*

China

China was one of the first country to implement circular economy principles in its law i.e. its 11th five-year plan. It defined its ambition:

- Eco-design and cleaner production strategies and actions
- Eco parks and networks with positive impact on regional economy and environment are promoted
- Sustainable production and consumptions activities are promoted to create a recycling-oriented society

To measure progress on these goals, the Chinese government have identified some KPIs that are still followed today:

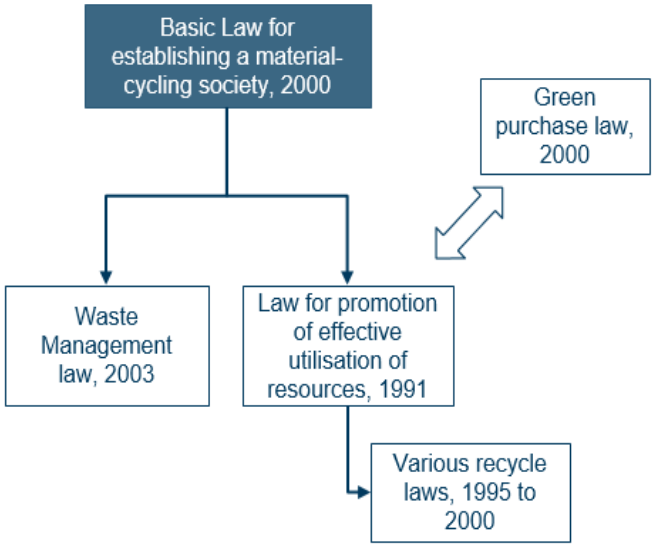
- Resource output rate comprising indicators such as output of main mineral resource or energy
- Resource consumption rate including energy consumption indicators (e.g. per unit of GDP, added industrial value, unit of product), water withdrawal, water consumption
- Integrated resource utilisation rate referring among others to recycling rates, water reuse ratios…
- Waste disposal and pollutant emissions including for instance amount of industrial solid waste for disposal, COD emissions
- Carbon emissions and ecological characteristics

Japan

As in China, Japan has implemented laws based on circular economy principles. Japan has also created a framework to monitor the progress made and the impact on the Japanese economy:

- Resource efficiency including indicators measuring the recovery of resources
- Material flows by weight measuring the flows within Japan and between Japan and the rest of the world (Sankey Diagram)
- Resource productivity, recycling rates and disposal rates indicators with revised targets for 2020 as part of material flows metrics
- Societal efforts metrics including size of market for rental and leasing of goods, surveys of consumer awareness and actions related to circularity
- General indicators such as capita generation of waste

Figure 12 - Relationship of Japanese CE laws



India

On its side, India has not enforced dedicated law on circular economy but instead has launched multiple programs with specific goals. The overall objectives of these programs can be classified in 4 categories:

- Environment & climate change
- Food & agriculture
- Cities & construction
- Mobility & vehicle manufacturing

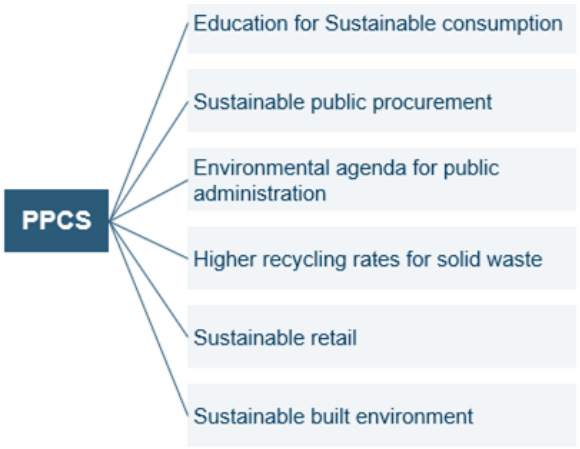
As for the other Asian countries, several frameworks have been created to follow the performance of these programs:

- **Zero Defect Zero Effect model** targets MSMEs and small business to produce products with zero defect (0 waste, 0 non-compliance) and zero effect (0 air pollution, solid waste…)
- **E-national Agriculture Market** is a digital portal for all stakeholder of the agriculture supply chain to access best practices on the market (i.e. resource use)
- **Faster Adoption & Manufacturing** of hybrid & electric vehicles in India (FAME) scheme was launched by the Department of Heavy Industry to support demand-driven R&D to achieve desirable target solutions and increase the domestic capacity of product & technology development
- The **Smart Cities and Clean India** missions aim at promoting sustainable housing, building green cities with decent quality of life and sustainable environment

Brazil

South America has decided some years ago to align on the UN initiative for sustainable production and consumption. Among them, Brazil has soon identified the importance of having a sustainable way of producing and consuming, particularly in a context of high growth.

Figure 13 - PPCS Key Priorities



In 2011, Brazil launched its National action plan on Sustainable Production & Consumption (PPCS). Its key priorities are listed in the graphic to the right. While launching this action plan, Brazil also set clear goals to reach within 5 to 9 years:

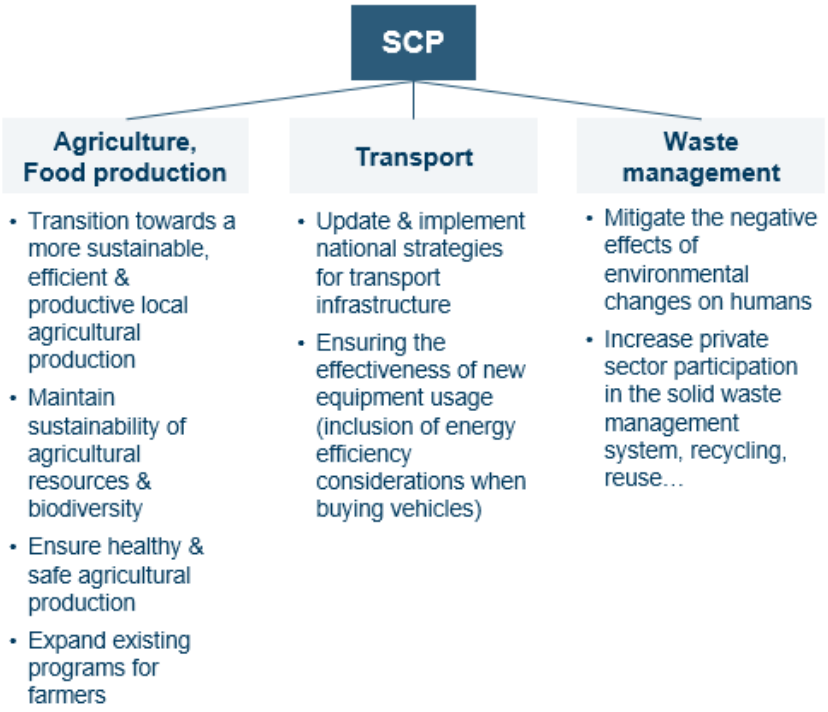
- +50% sustainable consumers in the mid class by 2014
- 20 sustainable procurement processes implemented in public administration by 2014
- Embed social-environmental responsibility with long-term strategies by 2014
- +20% recycling by 2015 and +25% more by 2020
- Encourage 50% of retailers to implement sustainable procurement policies by 2014
- +20% sustainability performance of construction in terms of water, energy, waste management and sustainable procurement by 2020

Setting these goals was a way for Brazil to follow its action plan and quickly be able to identify any gap or delay.

Jordan

In Middle East, Jordan too has launched its National strategy and action plan for Sustainable Consumption & Production, based on the UN initiative for sustainable production and consumption, as in Brazil. Launched in 2016, the plan has 3 pillars, as exhibited in the adjacent figure.

Figure 14 – Jordan's SCP 3 pillars



These pillars are inspired from some notions of circular economy. Indeed, the Jordan government has decided to base its action plan on circular economy to tackle the main threats that the country currently face.

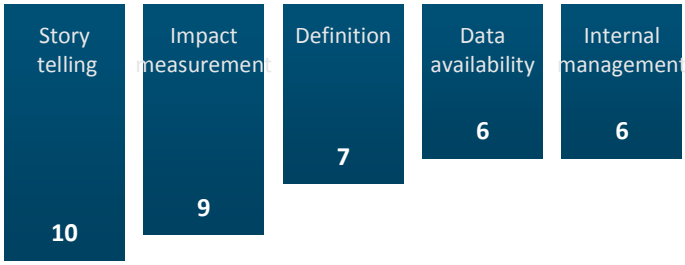
In cooperation with the SwitchMed project, Jordan has listed several KPIs that needed to be collected and analysed during the whole length of the action plan. Each pillar has its own KPIs:

- On Agriculture / Food production:
  - Amount of water and energy used in irrigation
  - Number of certified farmers/food manufacturers achieving environmental standards
  - Ratio sustainable agricultural land to all agricultural lands
  - Pesticides or fertilizers emissions to land
  - Number of businesses, products and services certified in the green or organic labels and other environmental label schemes
- On transport:
  - Amount of energy involved in getting the product to its markets
  - Ratio of passengers traveling by public transport
  - Ratio of citizens owning zero-emission and/or Electric Plugins and/or hybrid cars
- On waste management:
  - Proportion of waste sent to landfill sites
  - Amount of methane captured and flared off, or fed into biogas engines to generate power
  - Re-use of waste
  - Number of waste management companies

Challenges and enablers

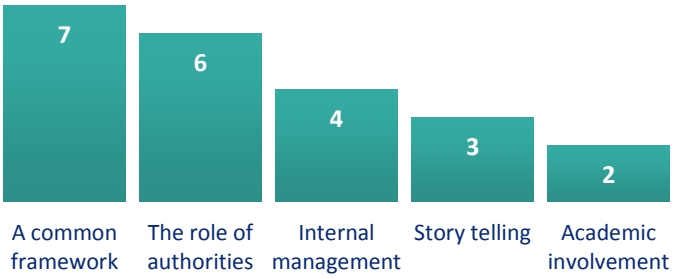
Interviewees identified many enablers and challenges for successfully developing a common framework for measuring circularity at the company level. These open response questions were noted and categorized to provide a clearer picture of the biggest opportunities.

Challenges



- **Storytelling** and effective communication of circular initiatives has proven to be a challenge for many companies. The framework must resonate with internal audiences such as top management or employees across different business units. However, it must also strike a cord with NGOs, policy makers and investors so that they understand how the framework creates value for them.
- It's one challenge to measure a company's circularity. It's another one to **measure (and value) the environmental, social and economic impact** of those circular activities. Translating "total circular procurement" or even "tons recycled" into endpoint indicators and impacts is not straightforward and can be an art as much as a science. However, it is critical to account for both positive and negative impacts (including rebound effects) that result from circular initiatives to establish a credible framework.
- The many distinct **definitions of the circular economy** will be a significant challenge in the beginning of the next phase of the project. However, establishing consensus across this first hurdle is critical to the future success of the project.
- The **availability of data** is a challenge tabled in most corporate sustainability metric conversations. Circular economy metrics are no exception. The creation of new metrics that have evolved from earlier sustainability or operational performance indicators makes this even a greater challenge.
- **Internal management**, or education and culture change, will be a challenge in integrating the circular metrics across a company. It will be critical to adopt metrics that drive individual, business unit and company performance improvement over time. This requires buy-in from top management and acknowledgement from employees that they have a role to play in the larger circularity of the company.

Enablers



- Establishing a **common framework** for how businesses across industries and value chains can understand and communicate the circular economy would be a big step in moving towards measuring it. This may wind up being the biggest challenge alongside creating a common definition. Establishing a shared framework for business allows exceptional companies to stand out from its peers, allowing investors to make more informed decisions and policymakers to better understand how to drive the private sector towards circularity.
- **Regulators and policymakers** can also be a way to improve the chances of success for a new circular measurement framework. Collaborating with key public sector stakeholders may improve uptake of the eventual framework. One of the companies interviewed had their circular measurement framework adopted by a national government, facilitating that company's ability to report to national agencies easier.
- Considering it was one of the biggest challenges anticipated, it's no surprise that **internal management** is one of the most cited enablers for a common circular measurement framework. The framework should strive to effectively empower employees to take on their roles in moving their company towards circularity.
- If the framework can allow companies to communicate with both internal and external stakeholders, or **tell a story**, it would amplify the chances of its success. Opportunities for doing this include establishing a clear link to company missions statement and policies or creating success stories.
- Inviting notable **academic institutions** to participate in the development of the framework would ensure credibility and rigor. Many companies interviewed mentioned ongoing collaborations they had with universities on the topic and shared their positive experiences in what the academics brought to the discussion. Similar to having regulatory or policy representatives participating in the development process, invited academic institutions would strengthen the conversation by challenging assumptions that might otherwise go unchecked.

Recommendations for a common framework on measuring circularity

There are seven recommendations for consideration when developing a framework for measuring a company's performance in the circular economy. These recommendations, which can also serve as principles for the framework, should be understood as a checklist and not a menu. Failure to integrate all recommendations may limit the applicability and uptake of the framework.

According to the outcomes of the landscape analysis, a common framework for measuring circularity at the company level should:

1. Drive circular business performance
2. Target specific audiences depending on company objectives
3. Cover a comprehensive sustainability scope
4. Ensure flexibility and inclusion
5. Adopt a phased approach to incorporating capitals
6. Build upon existing frameworks and standards
7. Drive culture change and provide guidance

1. Drive circular business performance

An effective circular economy measurement framework must not only drive the company to become "more circular" but also spur financial growth. The circular economy represents a "means to an end" as opposed to the end goal itself. As such, circular framework indicators should drive improvements in financial, environmental and social performance over time, not circularity itself. For example, measuring *circular revenue* or *circular percentage of portfolio* metrics would drive strong financial performance through circularity.

An important distinction the framework should make is to distinguish between a company's circular performance within its own operations ("processes") and its "products" and/or "services" that enable their customers and others down the value chain to improve their circularity. Products and processes are interrelated and each have implications on a company's overall circularity. While both processes and products both have impacts and dependencies on the environment and society, the magnitude, types and company control may vary between them. This draws parallels with the three scopes of the Greenhouse Gas Protocol. What a company monitors and manages within their own operations should be understood in context with the impacts and dependencies the company has on the environment, economy and society. This would require agreement on attribution of those impacts and dependencies across the whole life cycle.

2. Target specific audiences depending on company objectives

Companies should be able to communicate their circular performance to both internal and external stakeholders. A company may decide to include their circular metrics on their integrated performance dashboard for employee reference, in their integrated or sustainability reports for reporting bodies and investors, or in customer-targeted communications. Although executive management, customers

and employees are often the main target audiences for circular metrics, a company should be able to effectively communicate their circular performance with their priority stakeholders, such as regulators.

3. Cover a comprehensive sustainability scope

To honestly measure its circularity, a company should account for the financial, environmental and social aspects of its circularity. Only measuring the financial performance of circular activities may come at the cost of increased environmental or social burdens, and vice versa. For example, a company should not be rewarded for sourcing recycled content when child labor is used in the recovery and processing of that material.

Similarly, the framework should account for all resource inputs and outputs in its performance measurement process. Most importantly, the framework will account for the circularity of products and services put onto the market. Secondly, the scope of the natural resources that the circular framework should consider: materials (including minerals, soil, waste, etc.), energy (including air pollution and emissions) and water (including wastewater). Claiming to be "circular" without accounting for these natural resources and all three pillars of sustainability opens a company up to potential public scrutiny.

4. Ensure flexibility and inclusion

The development of a circular measurement framework must ride the thin line between flexibility and standardization to ensure comparability without discouraging mainstream business from moving towards circularity. The framework should apply to companies of all industries, value chain positions and maturity levels in their circular thinking. Recognizing and adapting to the differences in how companies measure performance when they are a financial services company versus a manufacturing company is critical. Additionally, two companies at different positions in the same value chain may have two different ways of measuring circularity or impacts. For example, a chemicals company may want to measure how their product enables circularity in another product downstream; whereas a finished good manufacturer would want to also understand how circular their product is. However, the boundary around the processes and products/services being measured must be consistent. One interesting example of categorizing the private sector to account for various roles in the circular economy is ABN-AMRO's classification of Producing companies, Facilitating companies and Customer-oriented companies.[1] (ABN-AMRO, 2017)

The framework should also be inclusive. To encourage pickup of the framework, it should highlight leaders in the circular economy without discouraging the companies just beginning their circular journey in measuring their performance over time. For example, the framework may allow companies to measure the circular performance internally and decide whether they disclose this value in their annual reporting and communications. Alternatively, the framework may normalize performance values per industry as opposed to companies in general.

[1] **(ABN-AMRO, 2017)**

Product or service and portfolio circularity are intimately related. Thus, the framework should permit measurement of circularity at the product level, without obligation. As product manufacturers and service providers increasingly adopt portfolio approaches to driving sustainability and circularity, the circular measurement framework should embrace it. Ultimately, a company is better able to drive the circularity of their portfolio if it understands what's going on at the product level. However, taking the additional steps to understand the circularity of each product may be cost prohibitive or irrelevant for some companies. As such, companies should be encouraged to measure circularity at the product or service level but not be required to do so.

5. Adopt a phased approach to incorporating capitals

There are many aspects with which a company should understand its performance in the circular economy. Some of those aspects are easier than others to quantify today. Consequently, the development and launch of the framework should occur in phases. This allows well-understood and higher priority aspects of the circular economy to be measured and monitored in the short-term while more complicated and less developed metrics are identified and integrated into the framework.

Using the IIRC structure of the six capitals, a circular performance measurement framework should address at least financial and natural capital in the first iteration. The next iteration should address human and social and relationship capital. Lastly, if not incorporated in a second iteration, both manufactured and intellectual capital in third iteration of the framework.

Another phasing approach should be taken when integrating the circular framework into regular business performance processes. Companies may wish to start with recycling and waste diversion metrics, then move to product redesign and ultimately to business model transformation. This is the process that many companies analyzed have incorporated circular metrics into their performance dashboard.

6. Build upon existing frameworks and standards

A circular measurement framework should recognize relevant existing standards and frameworks and build upon them without contradiction or competition. Existing products such as the Global Reporting Initiative, Natural Capital Protocol and the International Integrated Reporting Council's (IIRC) <IR> Framework are widely used by companies (and increasingly so). Building on top of this momentum would be much more favorable towards circular framework uptake than creating something new that doesn't align with these protocols. For example, the circular framework should be consistent with GRI's 306 Effluents and Waste standard and the World Resource Institute's Greenhouse Gas Protocol. A comparison of these existing frameworks and how they relate to the circular economy can be found in the Annex.

Increasingly, companies need to understand how their business model depends on and impacts natural, social and human capitals. The framework development team should consider using the IIRC's six capitals as a structure for assessing circular performance. These six capitals include: natural, financial, social and relationship, human, manufactured and intellectual. Although it may not be necessary to reference all six types of capitals in the framework, particularly in the beginning, the

consistency with an existing protocol that is growing in adoption rates across the private sector will facilitate circular framework adoption and integration.

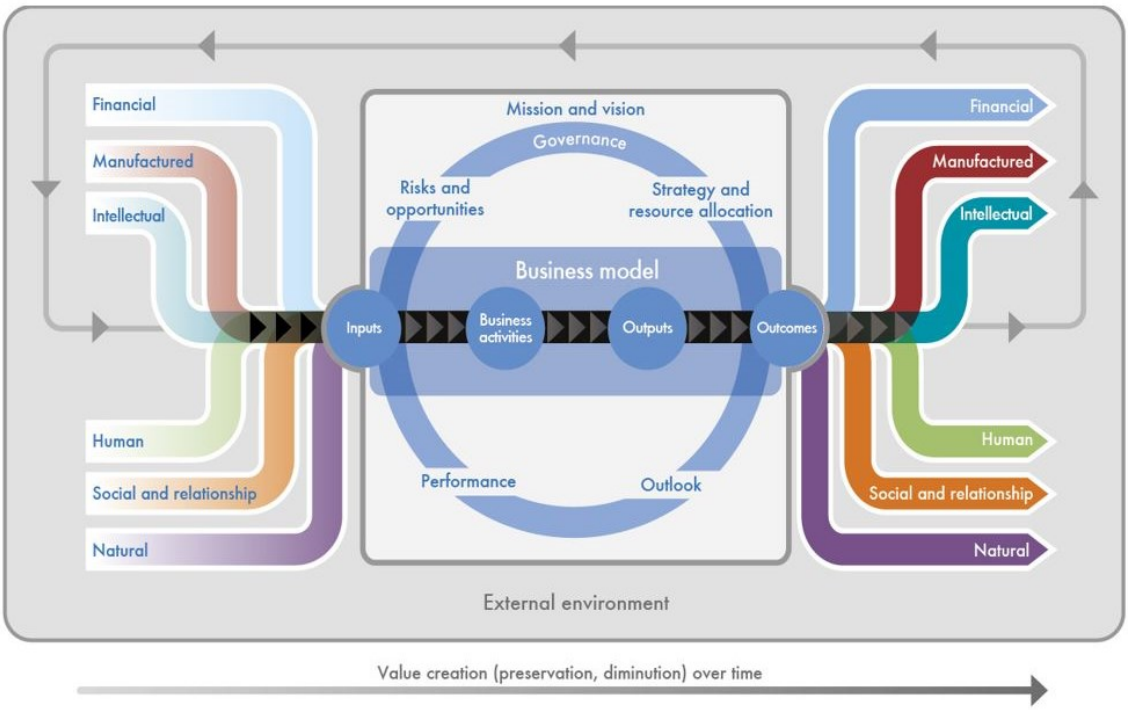


Figure 15 – International Integrated Reporting Council's Six Capitals (IIRC, 2018)

7. Drive culture change and provide guidance

A circular measurement framework should also drive company culture change and provide guidance to facilitate that change. Companies that have been the most effective in changing company culture towards circularity see a "circular mindset" driven from the top-down initially. Executives should buy into the concept and demonstrate their commitment to their employees. The framework may include elements that ingrain circularity into the company culture, such as incorporating it into the mission statement or developing a corporate or sustainability strategy upon it, tying individual remuneration to circular performance KPIs or providing education and training demonstrating the value that circular initiatives create for the company.

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Annex

Framework Comparison Table

Topic						
Framework	Natural Capital Protocol	Greenhouse Gas Protocol	Integrated Reporting Framework	Cradle to Cradle Certification	Global Reporting Initiative	Sustainable Development Goals
Objective	Process protocol Decision-making	Accounting protocol Reporting and communication	Principles and content framework Communication	Certification and impact assessment framework Product design	Reporting standard Reporting and communication	Global indicator framework Strategic initiatives
Principles	Relevance Rigor Replicability Consistency	Relevance Completeness Consistency Transparency Accuracy	Strategic focus and future orientation Connectivity of information Stakeholder relationships Materiality Conciseness Reliability and completeness Consistency and comparability	Eliminate the concept of waste Use renewable energy Celebrate diversity	Stakeholder inclusiveness Sustainability context Materiality Completeness Accuracy Balance Clarity Comparability Reliability Timeliness	Strategic focus on goals and targets Engage all stakeholder with common language
Capitals	Natural	Not mentioned but linked to Natural	Natural | Financial | Human | Intellectual | Manufactured | Social & Relationships	Natural | Financial | Human & Social	Not mentioned but linked to Natural | Financial | Human & Social	Not mentioned but linked to all capitals
Dimensions	Environmental	Environmental	Environmental, Social, Economic	Environmental, Social, Economic	Environmental, Social, Economic	Environmental, Social, Economic
Indicators	None	GHG emissions	None	61 indicators on Materials, Water, Energy and Carbon, Social, Economic	91 indicators among which Materials, Water, Energy, Biodiversity, Emissions, Effluents & Waste, Products & Services, Compliance, Transport, Social, Economic	232 indicators among which Materials, Water, Energy, Biodiversity and Land Use, Waste and Pollution
Link with CE	CE is identified as a strategic initiative that the natural capital valuation can support regarding decision making	Not mentioned	Not mentioned	CE EMF butterfly is based on the biological and technical cycles defined by the framework	Not mentioned but several indicators are linked to CE	Not mentioned but several indicators are linked to CE

Project Background

In recent years, the circular economy has increasingly appeared as the new model to pursue sustainable economic growth. As this momentum of the circular economy has grown, so has the number of indicators and methodologies for assessing progress. Governments, companies and non-governmental actors are developing various ways to measure progress towards a circular economy. Companies have indicated that best practice sharing, business-driven guidance and more consistency is needed across the circular KPIs and measurement landscape to steer company efforts to provide meaningful information to their various stakeholders and more convergence on this effort.

Following a stakeholder engagement process of WBCSD members and partner organizations, WBCSD formed and adopted Factor10, its circular economy program. One of the workstreams under Factor10 is to develop a consensus-based framework for measuring circularity at the company level and contribute business-driven input into public sector KPI frameworks.

The first phase of the workstream is to develop a landscape analysis of existing circular metrics and KPIs. This analysis will provide information to project members on: best practices; the metrics businesses, organizations, and governments are working on; the methodologies used, for whom, and why; the business value of why companies are measuring circularity; and recommendations for a common framework. This report is the conclusion of this phase.

The second phase will be to develop a common framework that includes recommendations and guidance for companies to measure and communicate their circularity. This framework will be developed through the working group members in consultation with different subject matter experts and stakeholders. This will be supported by case studies from members pioneering the measurement of circular economy within companies.

A third phase will involve company pilot tests and feedback collection. Following these initial phases, additional work will include awareness raising, advocacy and tool development to facilitate framework use.

Acknowledgements

WBCSD Co-authors	PwC Co-authors
Brendan Edgerton, *Manager of Circular Economy* **Elena Giotto**, *Associate of Circular Economy*	**Jan-Willem van den Beukel**, *Global Circular Economy Lead* **Jean-Baptiste Petit**, *Manager Sustainable Performance & Strategy* **Vladislava Iovkova**, *Director at Strategy&* **Nur Karapinar**, *Intern for Corporate Responsibility Office*

WBCSD thanks the following companies for their contributions to the landscape analysis:
WBCSD would first like to thank the following WBCSD Factor10 members for providing their perspectives: *Apple, ArcelorMittal (HQ & Brazil), BASF, CRH, DSM, Enel, KPMG, Michelin, Philips, PwC, Rabobank, Renault, Saint-Gobain, Solvay, Stora Enso, The Dow Chemical Company, Veolia, Yara.*

Secondly, WBCSD would like to thank the companies who generously offered their time and perspective to strengthen this work: *Altarea Cogedim, AXA, Canon, CCU, Coca-Cola Partners EU, Disal, E.Leclerc, Ecor, FIFCO, Flock, Florex, Groupe Casino, ING, Kering, Lafarge, L'Oréal, Owen's Corning, Pernod Ricard, PGGM, Seb, Suez, Umicore, Unilever.*

Lastly, WBCSD would like to thank the following organizations and institutions for either providing their perspective or inviting their members to participate: *Accion Empresas, ADEME, Alianza Empresarial para el Desarrollo, 2ACR, Circle Economy, Circular Economy Platform of the Americas, European Bank for Reconstruction and Development, Global Reporting Intitiative, International Reference Centre for the Life Cycle of Products, Processes and Services (CIRAIG), Italian Ministry of the Environment, Mines Paristech.*

PwC provided technical and strategic support for the circular economy metrics landscape for WBCSD only and solely for the purpose and on the terms agreed with WBCSD in relation to its engagement letter dated 8 May 2018. PwC accepts no liability (including for negligence) to anyone else in connection with this content.

This activity has received funding from the European Institute of Innovation and Technology (EIT) under grant agreement No TC2018A_2.1.4-CirMet_P308-1A. This European body receives support from the Horizon 2020 research and innovation programme.

Media information

World Business Council for Sustainable Development (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 $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. www.wbcsd.org

Factor10
The future of business is circular, and there's no room for waste in it. Factor 10, WBCSD's new circular economy program, aims to bring circularity into 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.

In order to reach Vision 2050 in which not a particle of waste exists, eco-efficiency of materials must improve by a factor of 10. This target was previously referenced by the Factor10 Institute in 1994 when they called for the ten-fold improvement in resource efficiency. Learn more about Factor10 at https://www.wbcsd.org/Programs/Energy-Circular-Economy/Factor-10

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. Drafts were reviewed by Factor10 Circular Metrics workstream participants, 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 May 2018.

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