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# CIRCelligence by BCG

*It's Time to Close Our Future Resource Loops*

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# CIRCelligence by BCG

*It's Time to Close Our Future Resource Loops*

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and Lena Bayer**

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## AT A GLANCE

Global economies are running out of resources that are the foundation for our society's wealth and prosperity. The movement toward a circular economy could solve many of our current societal challenges, but it's not going fast enough.

### **ONLY 10.4% OF THE GERMAN ECONOMY IS CIRCULAR**

The circularity of Germany's economy is growing by 0.1 percentage points per year—currently reaching a total circularity of 10.4%. Even if the country were to double its efforts, it wouldn't reach the required circularity of 50–70% to stay within the regenerative capacity of our planet until 2215. By this time, many of the planetary boundaries will have probably already been crossed.

### **TRANSFORMATIVE CHANGE OPENS AN ANNUAL €140 BILLION-200 BILLION ECONOMIC OPPORTUNITY FOR GERMANY**

Starting to operate within the regenerative capacity of our planet does not only have environmental benefits, it also provides companies with a vast economic opportunity. By comprehensively implementing circular thinking in the economic system, €140 billion–200 billion in gross value could be added to the German economy—roughly 5% of GDP in 2019.

### **CIRCELLIGENCE BY BCG SUPPORTS COMPANIES ON THEIR JOURNEY TOWARD A CIRCULAR ECONOMY**

Currently, many companies struggle to integrate circular solutions holistically. CIRCelligence by BCG is a strategic approach that enables businesses to integrate their circular strategy into their core business strategy in a way that delivers major economic benefits and also maximizes total societal value.

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## 1 Executive Summary: We Have an Obligation and an Opportunity to Close Our Future Resource Loops

Despite growing awareness of overconsumption, the global economy continues to exploit natural resources at increasingly unsustainable levels. On average, humanity currently uses the resources of 1.75 Earths per year. If every person lived like the average German, we would need approximately 3 Earths to satisfy our annual resource consumption and waste generation.<sup>1</sup>

The regenerative and continuous cycling of resources within the closed loops of a circular economy provides a solution to the overexploitation of natural resources. In a circular economy, products are used and repaired for as long as possible. They are then deconstructed, so that their original constituent materials can be utilized again to create new and similarly valued goods.

The current state of the circular economy in Germany is insufficient. In 2019, only 10.4% of the German economy was circular—meaning that only 10.4% of the resources used for production came from recovered materials. By comparison, the global economy averages 8.6% circularity.<sup>2</sup> However, a circularity of 50–70% would be required to stay within the ecological constraints of our planet.

The progress made toward a circular economy has been sluggish. Over the past six years, the German circularity rate has only improved by 0.1 percentage points per year. Even if Germany were to double its current rate of progress, it would take at least until 2215 for the country to reach 50% circularity.

The arguments in favor of a circular economy are not only ecological, but also economic. Economies need resources to produce goods and services, and ultimately to create shareholder value. Without drastic improvements in circularity, companies will face resource constraints that interfere with their medium- and long-term operations.

To join the circular economy, companies must evaluate their whole business model and ask themselves the following questions:

- What types of materials are being used, and how does product design need to change to optimize material usage?
- How are products designed, produced, and sold to enable a continuous and closed flow of resources?
- What types of business models are required to allow for product longevity, take-back, and recycling?
- What sorts of new ecosystems must be implemented to enable the reuse, refurbishment, and recovery of raw materials?

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Only 10.4% of the German economy is circular, but a circularity of 50–70% would be required to stay within the ecological constraints of our planet.

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<sup>1</sup> Global Footprint Network National Footprint Accounts, 2019.

<sup>2</sup> Circularity Gap Report, 2020 (<https://www.circularity-gap.world/2020>, accessed June 18, 2020).

For Germany, the movement toward a circular economy could provide €140 billion–200 billion in annual economic opportunity by 2030. This figure does not even include additional value for the environment and the reduced societal costs in the future. Most of the economic value comes from recovering and reusing circular materials. To capture this value, companies will need to redesign their products, implement new take-back systems, establish novel business models, and develop new recycling technologies. Circular economy initiatives can also generate new market opportunities, strengthen customer relationships, reduce risks, increase employee motivation, and make supply chains more resilient. This resilience can help companies withstand unexpected shocks, such as the COVID-19 pandemic.

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Ultimately, companies will have to transition from value chains toward true value cycles.

Despite these numerous advantages, most companies are still struggling to implement circular solutions holistically. Instead, they continue to focus on isolated lighthouse projects that may improve the current linear system but cannot enable transformative progress toward a true circular economy. To make such progress, companies will need to take broader, more strategic actions while making sure they can measure progress toward their circularity goals.

CIRCelligence by BCG is a comprehensive strategic approach that enables businesses to integrate their circular strategy into their core business strategy in a way that delivers major economic benefits and also maximizes total societal value. CIRCelligence considers the whole value cycle from input to end of life, thereby the framework helps transform value chains into value cycles, and evaluates opportunities to place circular thinking at the heart of the business and ecosystem.

Using a proprietary calculator, CIRCelligence evaluates a company's current circularity and provides fact-based recommendations on cost savings, future business cases, and initiatives to increase circularity. This approach supports companies in building the strategic foundation for their circular economy journey and provides top management with required data and insights. CIRCelligence can help companies take their first steps to adopt circular practices in a way that creates long-term value for shareholders and stakeholders.

For Germany to achieve a full circular economy and operate within planetary resource constraints before 2215, all actors—including governments, investors, and consumers—will need to act and make some immediate and disruptive changes. If we humans fail to respond adequately, then future generations may not benefit from the natural resources and ecosystem services that we take for granted.

In this report, we will evaluate the urgent need to move toward a circular economy, describe the concept itself, and explain its benefits for companies. We will then list some of the reasons why companies have not yet embraced a circular economy and explore a strategic approach—CIRCelligence by BCG—to how they can start making their operations much more circular and sustainable.



## 2 Introduction: Earth's Resources Are Being Overexploited in Ways That Put Societal Values at Risk

Within the first eight months of this year, humanity has already used up all resources the planet is able to regenerate within one year. The so-called Earth Overshoot Day marks the day each year when humanity's extraction and consumption of natural resources passes our planet's regenerative capacity. This year it lands on August 22. Last year it was almost one month earlier, on July 29. The considerable difference between the years is based on the COVID-19 crisis, which has temporarily slowed economic output and thus reduced some of the pressures on Earth's resources, but it has not fundamentally changed the linear nature of our economic system.

Not accounting for this year's exceptional situation, Earth Overshoot Day has moved an average of one day earlier for the past years. This means that we are using up Earth's natural resources faster and faster every year without giving the planet the chance to regenerate them. Over an entire year, we have reached the point where humanity now uses the ecological capacity of 1.75 Earths per year.

For Germany alone, the situation is even more dire. If all humans on Earth lived like the average German, we would have commemorated Earth Overshoot Day on May 3, 2020, and would need almost 3 Earths to satisfy our annual ecological resource consumption.

The overexploitation of natural resources underpins many serious societal challenges, including climate change, decreasing biological diversity, and increasing land-system changes, which are examples of the nine "planetary boundaries" that mark the safe operating space for humanity. As of today, we have already crossed four out of those nine planetary boundaries with unknown but certainly devastating effects for all living organisms (see side box "The Planetary Boundaries Define the Thresholds of our Planet").

Our economy requires resources and materials to produce goods and services. Without them, we cannot manufacture smartphones, build houses, or travel internationally. Earth's resources sustain our current wealth and underpin the ability of every company to generate value for its shareholders. If companies do not start managing resources sustainably, they will lose their license to operate and fail to satisfy shareholder demands. If we want to continue using the ecosystem services Earth is providing, we need to decouple economic growth from resource extraction so that we can stay within the boundaries of our planet's regenerative capacity.

One solution is to transition to a circular economy that is regenerative by design and ensures the continuous cycling of resources in closed loops. The European Union has already recognized the need for this transition. In 2015, the European Commission launched its first circular economy action plan to increase usage of secondary materials and to ensure that the resources used circulate within the EU economy for as long as possible.

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We have already crossed four out of nine planetary boundaries—with devastating effects for all living organisms.

## THE PLANETARY BOUNDARIES DEFINE THE THRESHOLDS OF OUR PLANET

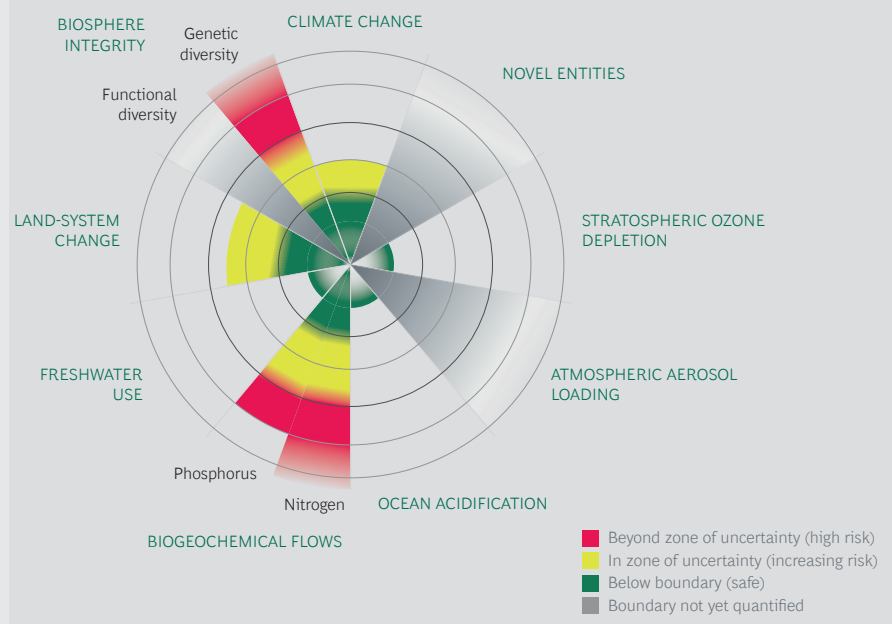
In 2009, leading scientists identified nine planetary boundaries that define the most crucial processes regulating the resilience of the Earth's ecosystems (see exhibit 1).<sup>3</sup> Crossing these thresholds will increase the risk of large-scale transformative and irreversible environmental changes:

1. Biogeochemical flows, nitrogen, and phosphorus (crossed)
2. Biosphere integrity (crossed)
3. Land-system change (crossed)
4. Climate change (crossed)
5. Freshwater use (not yet crossed)

6. Ocean acidification (not yet crossed)
7. Stratospheric ozone depletion (not yet crossed)
8. Atmospheric aerosol loading (not yet quantified)
9. Novel entities (not yet quantified)

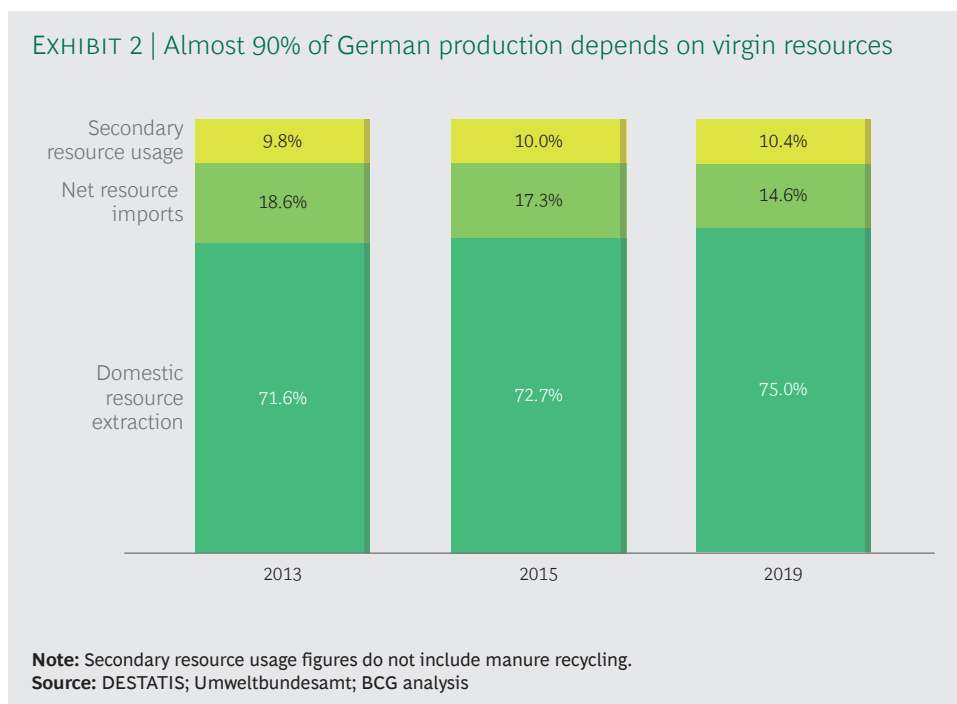
While resource consumption indirectly affects all nine planetary boundaries, especially one to six are directly influenced by excessive resource extraction, increased land and water use, and waste entering ecosystems, such as the ocean.

EXHIBIT 1 | Nine planetary boundaries marking the safe operating space for humanity



<sup>3</sup> Steffen et al., 2015 (<https://science.sciencemag.org/content/347/6223/1259855>, accessed June 18, 2020).

In Germany, official statistics claim that 81% of waste was recycled in 2017.<sup>4</sup> Yet, only 10.4% of the German economy is circular, meaning that only 10.4% of the resources used for production come from secondary sources (see exhibit 2).<sup>5</sup> The wide differences between the recycling statistics and the degree of circularity are due to different reporting and accounting techniques. Waste incineration for energy recovery and waste exportation are both defined as “recycling” for German statistical purposes. However, burned or exported waste cannot be used as secondary resource material within the country.



Germany does perform slightly better than the global circularity average of approximately 8.6%.<sup>6</sup> The German advantage stems largely from efficient take-back systems for certain materials (such as PET bottles), as well as effective separation of waste in both households and on construction sites.

Germany’s 10.4% circularity is far below the level required to stay within the regenerative capacity of our planet. Based on current overexploitation of ecological resources and services, we estimate that the German economy would need to reach a circularity of 50% to 70% to remain within the boundaries of Earth’s regenerative capacity.

Over the past six years, the German economy has increased its circularity by only 0.1 percentage points per year. Even if Germany doubled its current efforts and improved the circularity of its economy by 0.2 percentage points per year, Germany would need until 2215 to reach a circularity level of around 50%.

<sup>4</sup> Umweltbundesamt, 2017 (<https://www.umweltbundesamt.de/daten/ressourcen-abfall/verwertungsquoten-der-wichtigsten-abfallarten>, accessed May 4, 2020).

<sup>5</sup> Secondary resource use not including manure recycling; values are based on production volumes.

<sup>6</sup> Circularity Gap Report, 2020 (<https://www.circularity-gap.world/2020>, accessed June 18, 2020).

Germany would need until 2215 to reach a circularity that allows the country to stay within the regenerative capacity of our planet.

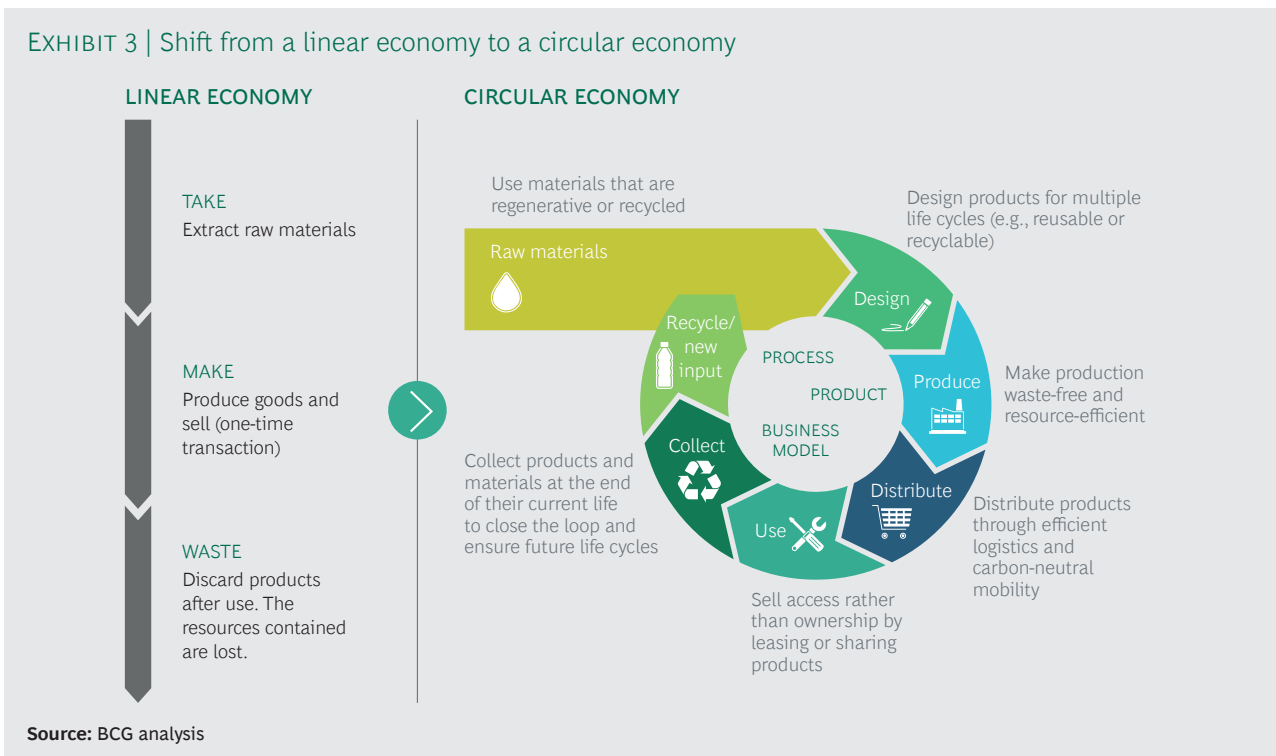
Neither Germany nor the rest of the world can wait that long to achieve a circular economy. Within the next 100 years, humanity will probably cross several planetary thresholds that will cause irreversible ecological damage. Although economies are gradually becoming more circular, such incremental change is no longer sufficient. The world needs more dramatic, disruptive changes to its current economic systems.

Comprehensive changes toward a truly circular economy would ameliorate many of the societal and economic challenges that we face today and provide us with a way to live sustainably within planetary resource constraints despite a growing population. For Germany, the transition to a circular economy would generate €140 billion–200 billion per year in economic opportunity by 2030 and would support the country in staying competitive internationally.

### 3 The Circular Economy: An Annual €140 Billion–200 Billion Economic Opportunity for Germany

#### 3.1 A SOLUTION TO START OPERATING WITHIN THE LIMITS OF OUR PLANET

The circular economy rejects our current “take, make, waste” mentality in favor of an economic system that is regenerative by design (see exhibit 3).



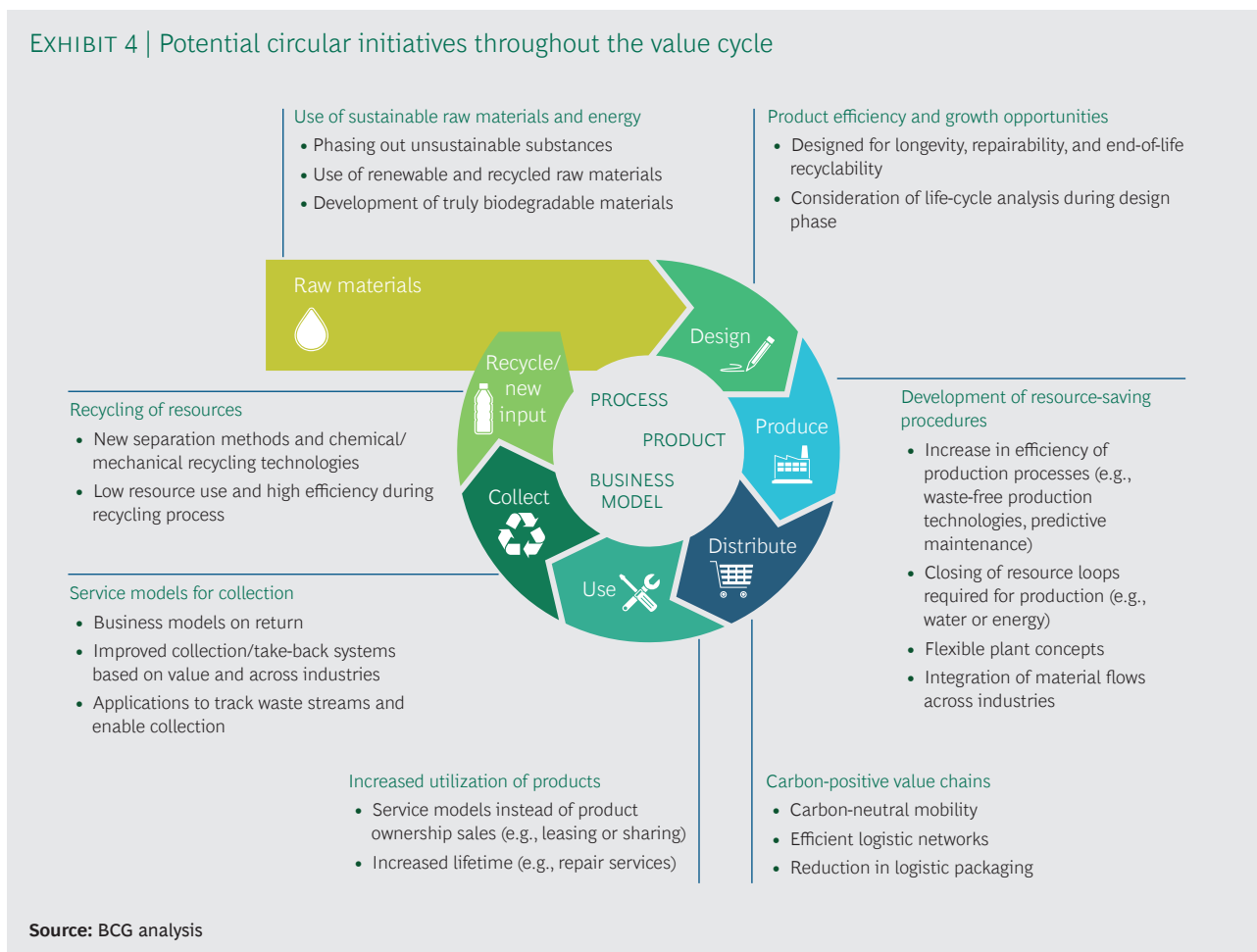
Circular economies are based on the continuous cycling of resources in closed loops. In practice, that means once a product has reached the end of its life after multiple periods of reuse, it is deconstructed into its initial resources, which are then used

again for new products and goods with equal or greater value. In a perfect world, resources would be cycled endlessly in the circular economy without any major losses.

The idea of closed resource loops is applied to all types of resources, including the resources needed by a product itself (e.g., raw materials), to produce a product (e.g., energy or water), and for the sales and later recovery of the material (e.g., energy). At the end, the goal of a circular economy is to upcycle or recycle all types of resources for as long as possible before they are downcycled or incinerated.

Product, process, and business model innovations play a key role across the entire value cycle in achieving a circular economy. Core principles of circular economies include concepts such as durability, renewability, refurbishment, and reduced material input.

There are multiple examples of concrete circular initiatives throughout the whole value cycle (see exhibit 4 for an overview).



To achieve a circular economy, companies need to revolutionize key characteristics of their operations and business models by evaluating aspects from production processes to product design and delivery according to the new economic system.



In chapter 4, we will explore CIRCelligence, a BCG methodology that supports companies in building upon current success factors and established practices to make the transition to a circular economy. CIRCelligence supports companies in embedding circular thinking in the organization by linking it directly to corporate strategy and existing values.

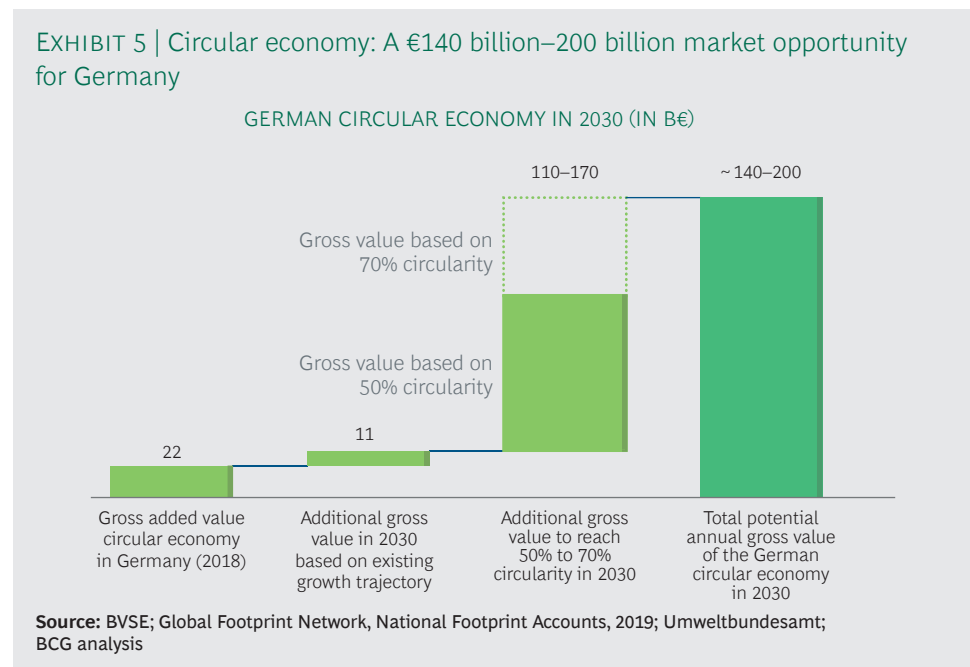
### 3.2 AN ECONOMIC OPPORTUNITY AS LARGE AS 5% OF GERMANY’S GDP

By integrating circular thinking into their business models, companies can obtain economic benefits while simultaneously creating positive environmental and societal impact. To evaluate the economic opportunity of the circular economy for Germany in 2030, we estimated the growth of the sector based on the current growth trajectory and the gross value of additional secondary resources that are required to eliminate resource overexploitation and stay within the regenerative capacity of our planet.

In 2018, the circular economy added around €22 billion in gross value to the German economy at an annual growth rate of 3.4%.<sup>7</sup> Assuming this trajectory holds steady despite the potential impact of the COVID-19 crisis, the German circular economy would be worth €33 billion per year in 2030.

The German circular economy could reach €140 billion–200 billion by 2030, which equals around 5% of Germany’s GDP in 2019.

To achieve a circular economy, we assume 50% to 70% of German production would need to be based on secondary resources. This translates into roughly 700 million to 1,000 million tons of secondary materials. Based on the current gross added value of Germany’s circular economy, the recovery, sale, and use of these materials would add €110 billion–170 billion in gross value. In total, the German circular economy could reach €140 billion–200 billion by 2030, which equals around 5% of Germany’s GDP in 2019 (see exhibit 5). This estimation is rather conservative, as innovations, novel business models, and rising prices can further increase the total value of the circular economy in Germany.



<sup>7</sup> Bundesverband Sekundärrohstoffe und Entsorgung, 2018 ([https://www.bvse.de/images/pdf/Nachrichten\\_2018/Statusbericht\\_2018\\_Ansicht\\_und\\_Druck.pdf](https://www.bvse.de/images/pdf/Nachrichten_2018/Statusbericht_2018_Ansicht_und_Druck.pdf), accessed June 1, 2020).

## HOW CIRCULAR PRACTICES CAN HELP COMPANIES REBOUND FROM COVID-19

The COVID-19 outbreak has highlighted our dependence on global supply chains and the ways in which the operations of international economies are interlinked. Although the final economic consequences of the pandemic are not yet clear, companies know that they need to protect themselves in case of a future pandemic and make up for the losses incurred during the crisis.

A circular economy can help achieve both of these goals. By creating circular products and continuously reusing resources, companies can increase their control over the supply chain and improve access to locally available resources. Fast moving consumer goods (FMCG) companies, for example, experienced demand surges and consumer preference shifts during the COVID-19 crisis. Moreover, policy changes, travel bans, and closed processing plants have disrupted their international supply chains. Relying on secondary resources and recovering them locally allows FMCG players to relocalize supply chains and increase supplier resilience in case of future crises. Moreover, companies can use this unique opportunity to embrace the required shift towards digital and embed circularity into the fulfillment flow with new distributors.

Now is the time for the FMCG industry to “build forward better”. Circular companies will also be able to recover more quickly from the recent economic downturn. By their nature, circular business models are consumer-centric and focus on services instead of pure sales. Because they are closer to consumers, circular companies have an advantage in understanding and adapting when consumer preferences and requirements change quickly in response to external shocks such as the COVID-19 pandemic. Moreover, circular companies will have rapid and easy access to the resource supply they need to ramp up production quickly as soon as demand picks up.

Lastly, consumers who have been impacted by COVID-19 may place even more value on a company’s image and purpose. COVID-19 has demonstrated the power that natural forces such as viruses still hold over humans. As a result, people may recognize the need to live within our planetary boundaries and might shift their consumption toward companies that truly operate in harmony with nature.

Beyond the long-term economic opportunity of a circular economy, companies can see multiple immediate benefits from adopting circular thinking. According to a recent BCG survey of senior executives, 53% of respondents said that circular economy

activities make their companies more profitable.<sup>8</sup> The increase in profitability stems from several near-term benefits including the following:

- **Increased top-line growth.** Circular thinking opens new markets and market segments for companies and enables them to reach additional customers through innovative circular business models and products. For example, a sharing or rental model for a power tool and heavy equipment manufacturer allows the company to capture a market segment of heavy users that require the service of a constantly working power tool or heavy equipment for example on a construction site. Moreover, companies have the opportunity to sell their waste streams as input materials to other industries or companies—potentially generating additional revenues and decreasing the cost associated with waste disposal.
- **Stronger customer relations.** In contrast to linear business models that are focused on selling a product to a customer, circular business models revolve around continuous interactions between customer and company. These interactions provide plenty of opportunities to collect data and improve customer relationships. For a company that sells a product like tires, for instance, it is difficult to gather information about exact usage, maintenance, and additional requirements of their customers. By changing to selling the service of having intact tires, the company needs to interact with the client on a continuous basis to do the maintenance, exchange parts, or solve any potential issues with the tires. Through these interactions, companies can build stronger customer relationships while picking up valuable information about product performance and customer needs. This stronger relationship can increase customer retention, while the additional information can yield insights that lead to product or service innovations.
- **Improved internal efficiency and reduced risks.** Supply chains are increasingly being disrupted by environmental damages and global crises, such as the COVID-19 outbreak (see side box “How Circular Practices Can Help Companies Rebound from COVID-19”). Circular companies actively mitigate these risks and improve their resilience. For example, increasing overconsumption of natural resources is decreasing the availability of certain raw materials necessary for production. Since circular companies are less dependent on virgin resources, they face less risk from resource scarcity or rising prices when demand for virgin resources outpaces available supplies (see exhibit 6).

Circular companies can achieve better operational efficiency by eliminating material leakage, designing production in ways that require fewer resources, and circulating those resources internally multiple times to maximize their economic value.

Circular companies can also simplify and improve logistics by recovering secondary resources internally or obtaining them from suppliers that are geographically close to where the end product is consumed. These changes reduce logistic costs, increase speed to production, and make companies less dependent on a few selected suppliers of virgin raw materials. By changing from value chains to value

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<sup>8</sup> BCG survey of 75 respondents mainly working at large companies (77% worked at companies with > 5,000 employees) that operate globally (> 50% worked at global companies).

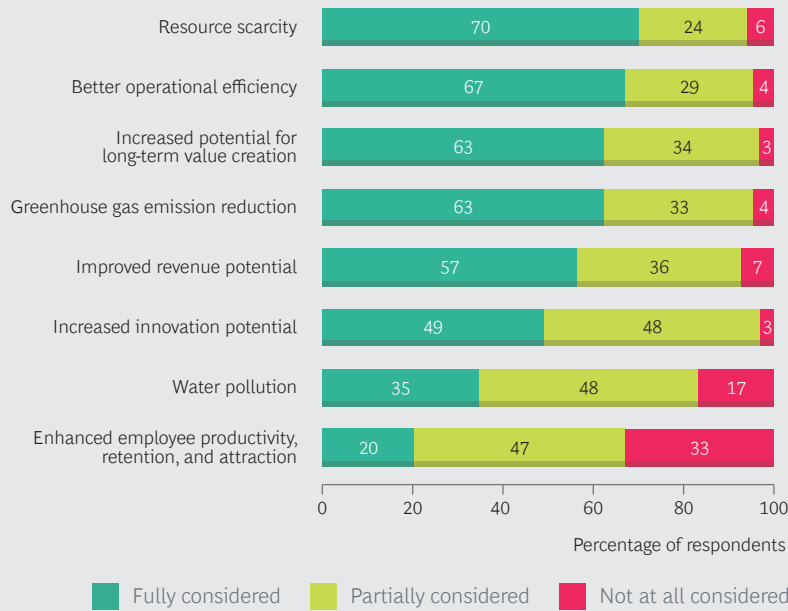
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cycles, companies can maintain control over the resources that went into creating the product even after the product has reached the end of its first life. By recapturing these resources instead of discarding them, companies with circular business models face much lower risks in the event of any supply chain disruptions.

- Staying ahead of the regulatory curve.** Governments and international regulatory authorities may not be moving quickly, but they are starting to take steps to encourage the development of more circular economies. As mentioned above, the European Commission launched its first circular economy action plan in 2015 and released a new one in 2020. Companies that act now to adopt circular thinking and implement circular business practices can have a voice in shaping circular economy solutions. By contrast, those who lag behind now may need to scramble later to comply with circular economic industry standards set by competitors who moved faster.

EXHIBIT 6 | Companies consider these aspects when engaging in circular economy activities



Source: BCG survey of 75 managers

The following key external stakeholders frequently reward or require companies to adapt circular business models. BCG's survey identified customers and governmental agencies as the strongest players.

- **Customers:** Nearly 73% of global consumers state that they would definitely change their consumption habits to reduce environmental impact.<sup>9</sup> Circular economy products are no longer a niche segment. Recycled content in packaging is considered a must for many consumers. Companies need to meet such rising consumer expectations to remain competitive.
- **Governmental agencies:** The EU just recently published its new circular economy action plan. The plan includes a new legislative framework to establish sustainability principles around circular design, recycled content, environmental footprint, and circular business models. In addition, the EU plans to reward products based on their sustainability performance.<sup>10</sup>
- **Investors/shareholders:** Margin premiums in certain industries are linked to a strong performance in environmental topics. Within consumer packaged goods for example, companies that actively ensure a responsible environmental footprint can expect 1.3 percentage points more in EBITDA and a 3.3 percentage point rise in gross margin. Consequently, an increasing number of investors takes these aspects into consideration.<sup>11</sup> Additionally, companies have a duty to act in the best interests of their investors and owners. Hence, active risk management and increased resilience of the company through circular initiatives is a basic requirement.
- **Employees:** Employees are willing to go the extra mile for companies they believe in and stay longer at those companies. Moreover, companies known as being environmentally friendly have an advantage in attracting and retaining talent. To take advantage of these benefits and demonstrate their circularity ambition to employees, multiple companies organize corporate recycling activities, such as corporate cleanup events close to the facilities or organized removal of plastic waste from bodies of water.
- **Peers:** An increasing number of companies have recognized the need to respond to societal challenges and have announced ambitious plans to improve their environmental performance. For example, over 40 companies have pledged \$1.5 billion through the Alliance to End Plastic Waste to rid the environment of plastic refuse.<sup>12</sup>

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9 Nielsen, 2018 (<https://www.nielsen.com/us/en/insights/report/2018/unpacking-the-sustainability-landscape/>, accessed June 18, 2020).

10 European Commission, 2020 ([https://ec.europa.eu/environment/circular-economy/index\\_en.htm](https://ec.europa.eu/environment/circular-economy/index_en.htm), accessed June 18, 2020).

11 Total Societal Impact, BCG, 2017 (<https://media-publications.bcg.com/BCG-Total-Societal-Impact-Oct-2017.pdf>, accessed June 29, 2020).

12 Alliance to End Plastic Waste (<https://endplasticwaste.org/about>, accessed May 26, 2020).



### 3.3 RESOURCE-INTENSIVE INDUSTRIES WITH THE HIGHEST BENEFIT TO ACT IMMEDIATELY

Potential circularity initiatives vary between industries. In general, companies that heavily rely on linear systems due to high resource needs or short product life cycles can benefit the most from implementing circular strategies.

For example, the packaging industry relies mainly on single-use products that are discarded at the end of their lifetime, typically without any material recovery opportunity. The amount of packaging waste is increasing yearly in Germany. Plastic packaging in particular receives high public pressure, despite the fact that the total amount of plastic packaging waste is fairly low, comprising only 0.8% of the weight of Germany's total waste streams.<sup>13</sup> Various fast-moving consumer goods players and retailers have already responded to this public pressure by steadily increasing the recycled content in their plastic packaging and looking for new solutions to outperform their competition on circularity. A change from plastics to cardboard, glass, or aluminum containers would shift value pools and provide opportunities for these sectors to close the loop while communicating the value these materials provide to society. At the same time, chemical and waste treatment companies are finding value pool opportunities and making strategic bets on new recycling and treatment technologies, from chemical recycling solutions to cleaner material streams in mechanical recycling.

The construction industry has the highest waste volumes in Germany—accounting for more than 50% of total waste by weight<sup>14</sup>—but is experiencing relatively low public pressure. This lack of pressure reduces the short-term need for companies to act based on external risk management. However, the governmental entities that are significant project owners in this field will likely increase regulations for this sector to create minimum recycling standards and incentivize circular companies to reach national circularity goals. Early movers in this industry can set industry standards and will likely have a competitive advantage in bidding for both public building and public infrastructure projects.

New recycling opportunities in upcoming and innovative markets can help Germany safeguard its strong international position and support the transition to renewable and sustainable energy sources. Various renewable energy technologies have received public scrutiny due to their reliance on virgin raw materials and on fossil fuels for their manufacturing. The use of secondary resources as input materials and new recycling methods for solar panels, electrical vehicle batteries, and wind blades can increase their sustainability and make them more competitive from an economic standpoint, while also improving public perceptions of these technologies.<sup>15</sup>

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13 Umweltbundesamt, 2016 (<https://www.umweltbundesamt.de/themen/abfall-ressourcen/produkt-verantwortung-in-der-abfallwirtschaft/verpackungen#>, accessed on June 19, 2020 and Abfallbilanz des Statistischen Bundesamtes Deutschland, [https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Umwelt/Abfallwirtschaft/\\_inhalt.html](https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Umwelt/Abfallwirtschaft/_inhalt.html), accessed on June 19, 2020).

14 Statistisches Bundesamt Deutschland, 2018 ([https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Umwelt/Abfallwirtschaft/\\_inhalt.html](https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Umwelt/Abfallwirtschaft/_inhalt.html), accessed May 4, 2020).

15 Detailed business cases and examples have been published in the following reports: “*The New Big Circle*” ([docs.wbcsd.org/2018/01/The\\_new\\_big\\_circle.pdf](https://docs.wbcsd.org/2018/01/The_new_big_circle.pdf)) and “*The CEO Guide to the Bioeconomy*” (<https://www.wbcsd.org/contentwbc/download/7723/122348>).

### 3.4 MISSING STRATEGIC DIRECTION HINDERS CURRENT IMPLEMENTATION AND DECELERATES UNLOCKING THE OPPORTUNITY

Businesses have already recognized the vast opportunities of the circular economy. In the BCG survey, 96% of respondents said they believe the circular economy is important for their company's future success, and 84% said they expect to increase their investments in circular economy projects in the future.

Nevertheless, little disruptive change has happened so far. Only 19% of the respondents had successfully implemented business model innovations, and only 14% see circular economy activities transforming the whole organization. This slow transformation is also reflected in the fact that the German economy still has a low circularity score of 10.4% and has improved its circularity at a rate of only 0.1 percentage points per year.

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Most companies struggle to understand how much change is necessary. As a result, they focus on single, isolated circular economy activities without tackling the issue strategically.

Most companies struggle to understand how much change is necessary. As a result, they focus on single, isolated circular economy activities without tackling the issue strategically. The majority of the lighthouse projects they implement merely focus on certain aspects of a circular economy (e.g., higher amount of recycled content or waste reduction during the production process), without evaluating potential opportunities holistically and considering the whole value cycle from design to end of life, including material recovery options. Success with transformative circularity initiatives depends on three key factors:

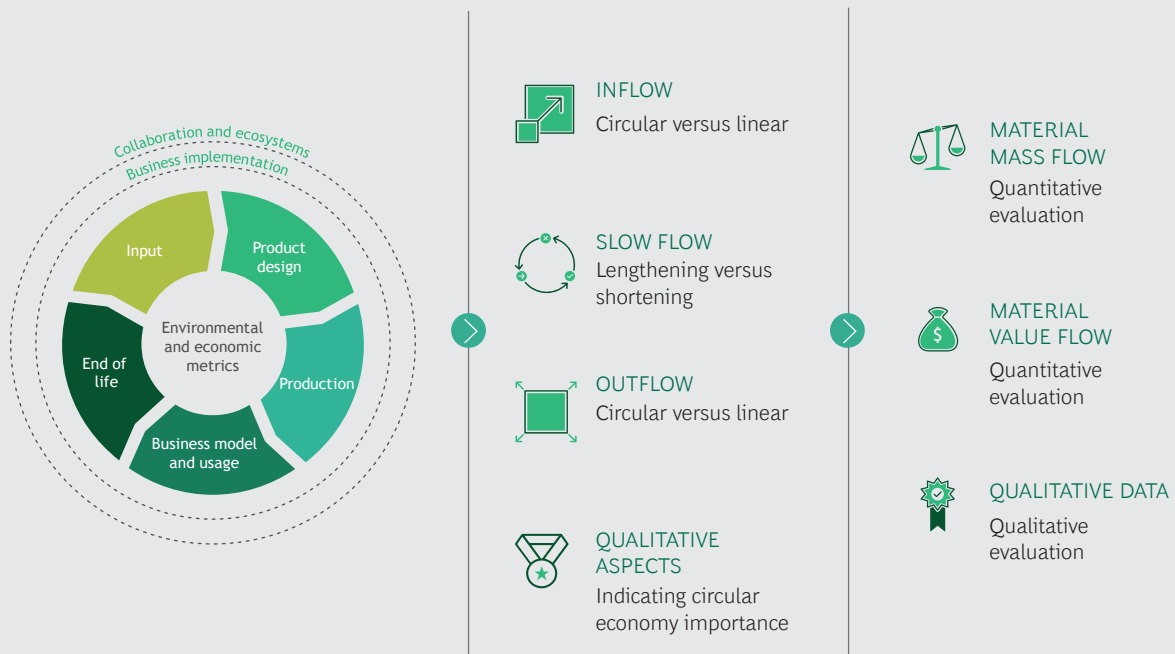
1. **Comprehensiveness.** To be successful, circular initiatives must evaluate the entire value cycle from design, usage, and business models to end of life and later recovery. For example, if a company only increases the amount of recycled input material without changing the design of the product itself to enable recycling, it will soon run out of the recycled materials it needs for new products. Even if the product is designed to be fully recyclable, the necessary infrastructure for taking back and actually recycling the product must exist for the design goal to be realized.
2. **Transparency.** Companies need to be clear about the economic implications of their transition to a circular economy. In what areas does the company have the strongest lever to increase its circularity? What is the underlying business case? What implications would circularity changes have for the company's internal and external image? Top management must have credible answers to these questions in order to make appropriate strategic choices.
3. **Measurability.** In order to analyze the status quo properly, set goals, and evaluate improvements, organizations must be able to measure the impact of decisions made to improve circularity. Such measurement breaks down abstract concepts into measurable quantitative units that can be understood from an economic perspective and allows management to steer the company efficiently.

## 4 CIRCelligence by BCG: Supporting Companies on Their Journey to a Circular Economy

CIRCelligence by BCG offers companies a strategic approach for starting their journey to become part of the circular economy. CIRCelligence helps companies to move beyond isolated activities that have little economic impact and to start anchoring circular economy concepts into their corporate strategies to achieve superior financial results. The framework provides a comprehensive perspective that enables top management to identify key value drivers and embed circular strategies within the whole company from executive steering to final implementation on an operational level.

The holistic CIRCelligence framework analyzes the entire value cycle from inputs to end of life, including the anchoring of circular thinking into the business and ecosystems. For each value cycle step, the type of resources flowing into the company (inflow), the duration of resource use (slow flow), the type of resources flowing out of the company’s boundaries (outflow), and qualitative aspects are considered. CIRCelligence not only examines the pure material flow along the value cycle, but also considers material value and explicitly embeds corporate steering and engagements with the broader business ecosystem (see exhibit 7).

EXHIBIT 7 | Comprehensive methodology to assess circularity along several flow types and to determine mass, value, and process performance



Source: BCG analysis

CIRCelligence has three main steps to make a circular strategy an integral part of the larger corporate strategy (see exhibit 8).

EXHIBIT 8 | Insights from CIRCelligence provide a foundation for a company's circular economy strategy



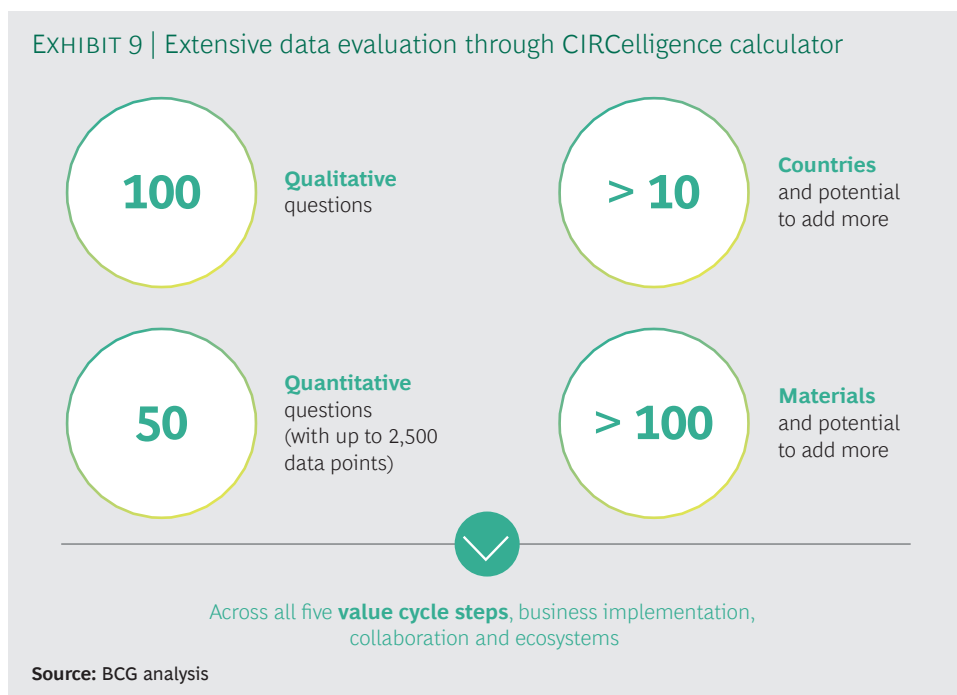
Source: BCG analysis

- 1. Create transparency.** CIRCelligence uses a proprietary calculator to generate basic quantitative and qualitative insights regarding status quo levels of circularity across a company's entire value cycle. This creates the required transparency for top management to understand existing competitive advantages and potential gaps regarding the integration of circular thinking across the company.
- 2. Develop actionable roadmap.** Through CIRCelligence, a BCG team can simulate different scenarios for the required activities and develops an ambition level for the degree of circularity a company can reasonably aim to achieve within a certain time frame. BCG then provides actionable recommendations on how to reach this ambition level and embed circular thinking across the organization.

3. **Implement key initiatives.** BCG supports companies in implementing key activities to reach their target ambition level by identifying key performance indicators (KPIs) that can be tracked to measure performance in terms of circularity goals. Moreover, CIRCelligence can be used for comprehensive internal and external stakeholder communication.

#### 4.1 STEP 1: CREATE TRANSPARENCY TO UNDERSTAND A COMPANY'S CIRCULARITY STATUS QUO

To evaluate a company's circularity status quo, CIRCelligence uses its proprietary CIRCelligence calculator. Through a customizable web-based survey, a BCG team collects answers to approximately 50 quantitative questions—with up to 2,500 data points—and 100 qualitative ones. The answers are used to generate insights regarding the inflow, slow flow, outflow, and qualitative aspects for each step in the value cycle and overarching business function. CIRCelligence is set up to analyze nearly 100 different input materials, and can be customized to analyze additional, novel materials upon request. To evaluate end-of-life implications, the tool performs independent analyses on up to 10 sales markets with the possibility to add more (see exhibit 9). This extensive data gathering and analysis generates a bevy of valuable quantitative and qualitative insights, allowing top management to make strategic choices and evaluate both the cost and business case implications of selected initiatives.



Based on the gathered data, the CIRCelligence calculator generates quantitative and qualitative circularity scores for each value cycle step and business function (see exhibit 10).



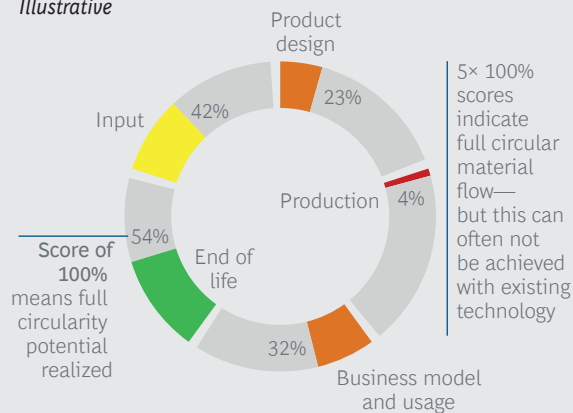
- Quantitative results are displayed using a scale from 0% to 100% to demonstrate the theoretical ideal of 100% circularity. Both a mass-based and a value-based score are derived from the analysis.
- Qualitative scores are displayed using grades from A to F to signify the extent to which the company has embedded circular thinking in its processes and governance structure.

The combination of quantitative and qualitative assessments provides the company with guidance on where to implement future circular initiatives and which factors will help ensure their successful implementation.

## EXHIBIT 10 | Quantitative and qualitative scores form the picture

### HARD FACTS ABOUT PRODUCT LIFE CYCLE CAPTURED VIA **QUANTITATIVE** SCORE

*Illustrative*



Quantitative scores are derived on a **mass basis** and **value basis**

The quantitative scores measure the **company's circularity for each step of the value cycle** and are reported as a percentage, from 0% to 100%

### SOFT FACTS ABOUT GOVERNANCE AND TOOLS CAPTURED VIA **QUALITATIVE** SURVEY

**Grade A:**

All efforts are made to establish and protect circularity. That means that the quantitative score is the result of effective steering

**Grade F:**

Effort and tools to establish circularity are not mature. That means that the quantitative score is coincidental and at risk



Highest score

Lowest score

Qualitative scores reflect **the governance, current efforts, and tool maturity** to manage circularity

This score helps distinguish **coincidental from intentional** circularity

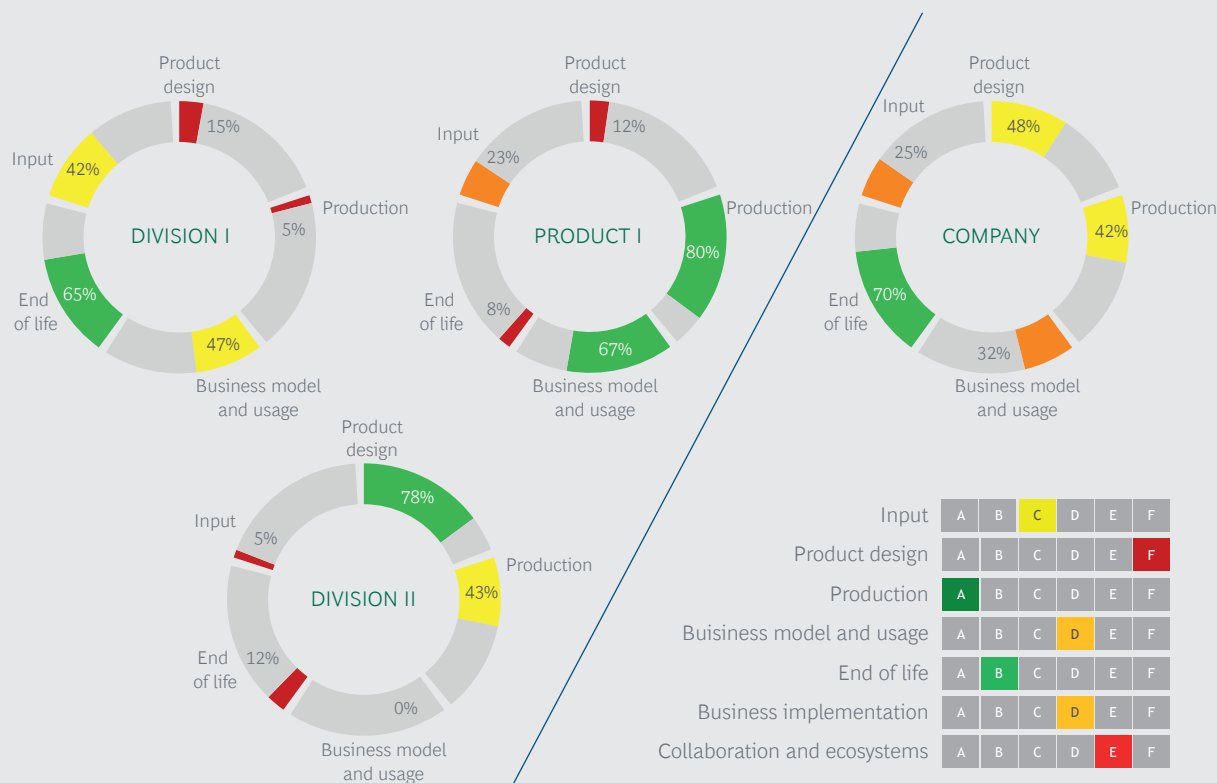
The results are displayed as a **grade system from A to F**

Source: BCG analysis

## 4.2 STEP 2: DEVELOP AN ACTIONABLE ROADMAP TOWARD GREATER CIRCULARITY

To develop an actionable roadmap that companies can use to improve their circularity, the BCG team drills down and identifies the root causes behind specific circularity scores. The CIRCelligence calculator uses different “lenses” to focus on circularity at different levels, such as product, product component, packaging, divisional, or company-wide performance (see exhibit 11).

EXHIBIT 11 | The circularity dashboard provides visibility at divisional, product, and company levels



Source: BCG analysis

The flexibility of these lenses can uncover the reasons behind specific circularity scores and identify possible solutions at an operational level. For example, the calculator might show that a certain division within a packaging company has exceptionally high circularity scores when using PET<sup>16</sup> as an input material. Data gathered by the CIRCelligence calculator could explain the high score by showing that the division works with a particular supplier that offers access to recycled PET at a price comparable to the virgin PET used by other divisions. The company could use this information to consider having other business units switch to using recycled PET from that supplier, thus improving the company’s overall circularity without having to make any major operational changes.

<sup>16</sup> Polyethylene terephthalate.

By analyzing the reasons behind circularity scores, BCG can help companies set realistic yet ambitious circularity goals that will satisfy stakeholders. Within circular economy strategies, setting ambition levels serves as a substitute for traditional competitive benchmarking. Ambition levels allow companies to evaluate their performance and track improvements while communicating the superior value they create to both customers and investors.

Based on each company's specific ambition levels, BCG evaluates the universe of possible circular initiatives the company could use to reach future circularity goals while creating shareholder value. Leveraging both basic insights and deeper analysis into root causes, CIRCelligence can identify actions that are likely to produce quick wins, as well as strategic initiatives that could provide competitive advantage for the company over a longer time horizon. Additionally, once the tool is set up for a specific company, it can be used to easily simulate different improvement measures and evaluate potential future scenarios.

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CIRCelligence by BCG guides companies on a path toward greater circularity, shows them how to measure their progress, and enables them to communicate that progress to consumers and investors.

Circularity is just one factor that top executives need to consider alongside other criteria, such as cost and technical feasibility, when making strategic decisions. The insights also support the company in determining where to focus its resources and attention in order to maximize the ROI of circularity projects from both an economic and an environmental perspective. Executives can then leverage BCG's cost-benefit assessments to prioritize those circularity initiatives that are likely to have the greatest beneficial economic impact for the company with the fewest trade-offs.

#### **4.3 STEP 3: IMPLEMENT KEY INITIATIVES USING MEASURABLE KPIS AND GOALS**

After prioritizing, BCG supports the implementation by setting out clear KPIs for companies to use at different organizational levels. These KPIs give companies a better chance of achieving success in high-priority circularity initiatives and make it easier to communicate progress on circularity in a clear, measurable way to various stakeholders, including investors, consumers, and governments. The CIRCelligence framework converts the somewhat amorphous concept of the circular economy into measurable and manageable units.

Ultimately, CIRCelligence provides the foundation for a company's circular economy journey by measuring baseline performance, setting a future ambition level based on key strategic decisions, providing actionable recommendations on how a company can create the most value through circular initiatives, and supporting the implementation of these initiatives through measurable goals and KPIs. CIRCelligence by BCG guides companies on a path toward greater circularity, shows them how to measure their progress, and enables them to communicate that progress to consumers and investors. By using CIRCelligence as a powerful communications tool, companies can demonstrate their future ambition level, share the success of their strategic circularity initiatives, and gain economic rewards from stakeholders who value such forward-looking behavior.

#### 4.4 CIRCELLIGENCE METHODOLOGY PROVEN TO WORK ACROSS INDUSTRIES

Here are two examples that illustrate the applicability of the CIRCelligence methodology across different industries.

##### 4.4.1 Hilti: Establishing a Leadership Position and Identifying Circularity Initiatives with Greatest Potential

Hilti, a Liechtenstein-based supplier of leading-edge technology to the global construction industry, is an advanced player in sustainability thinking within the industry. To advance sustainable change, the company wanted to explore business opportunities that leverage the potential of a circular economy.

CIRCelligence by BCG helped Hilti to understand its current circularity performance and identify a set of initiatives at the product, business model, and a company-wide level that are most likely to provide both significant economic and environmental benefits.

The CIRCelligence methodology demonstrated that Hilti already performs strongly on multiple circularity dimensions, for example Hilti's unique service offering with industry-leading repair services and the Fleet Management, or the share of recycled input material used. To further strengthen its position as an industry leader, BCG recommended Hilti build on this strong performance by setting realistic, quantified ambition levels for circularity, communicating its ambitions externally, and working towards achieving them through concrete initiatives:

- **On a product level**, CIRCelligence identified specific product groups with the highest potential for further circularity improvements due to their design and material specifications. This prioritization has allowed the company to channel existing ideas to focus on those initiatives with the highest possible impacts and to translate the large momentum for circularity within the company into a competitive advantage.
- **On a business model level**, CIRCelligence illustrated how Hilti can build upon its existing Fleet Management, as it is a unique advantage and strong driver for a high circularity score.
- **On a company-wide level**, CIRCelligence identified concrete initiatives that Hilti could use to leverage its existing circularity performance, make its entire product portfolio more circular, and embed circular thinking more deeply into the company's processes.

Hilti continues to use the CIRCelligence methodology and calculator as part of its annual reporting to consistently measure and communicate its progress toward achieving its circularity goals. In addition, the approach supports the company in continuously qualifying, quantifying, and tracking potential circularity opportunities and solidifying its status as an industry leader on circular business practices in the long term.

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CIRCelligence by BCG helped Hilti to understand its current circularity performance and identify a set of initiatives at the product, business model, and a company-wide level

#### 4.4.2 Automotive Industry: Identifying New Business Models to Decrease Resource Pressures for Electric Vehicle Batteries

The CIRCelligence methodology can identify quick-win opportunities for automotive companies to increase their circularity in the short-term and can also evaluate longer-term strategies for reducing the resource risks associated with electric vehicle batteries.

For quick wins, CIRCelligence can assess circular materials that manufacturers can incorporate into automotive exteriors and interiors to favorably differentiate their vehicles without incurring high costs and while increasing their circularity rate.

For longer-term strategic initiatives, battery recycling is a hot topic. Electric vehicle batteries have received public scrutiny due to their reliance on lithium and cobalt, and the resulting dependence on certain countries for resource supply. Through CIRCelligence, BCG can analyze new business models for batteries with a focus on reducing the risks associated with resource scarcity, fluctuating resource prices, and company perception. By exploring various options around battery ownership and collecting batteries at the end of their useful life, automotive companies can identify positive business cases that would improve their circularity, external stakeholder reporting, and decrease their supply chain risks and dependency on scarce raw materials.

Automotive companies can also use the CIRCelligence methodology and calculator to set specific KPIs and goals for top management and divisional managers to improve the company's circularity. The different levels of analysis built into the CIRCelligence calculator allow the company to track circularity improvements on an individual KPI level. By communicating circularity goals and related performance externally, automotive companies can broadcast their sustainability ambitions to all stakeholders, improving their transparency and gaining a competitive advantage in a sector where sustainability and circularity are increasingly valued by both shareholders and consumers.

### 5 Call to Action: A Complete Economic Change Requires All Players to Act Now

Realizing a true circular economy requires comprehensive economic changes toward closing resource loops. Right now, this transformation is not progressing rapidly enough to safeguard the supply of future resources for companies and societies. Nearly half of the major planetary boundaries have already been crossed. Each year, we reach Earth Overshoot Day a little sooner. Even if Germany were to double its current efforts to become more circular, the country wouldn't reach the required minimum circularity degree of 50% until the year 2215.

CIRCelligence by BCG provides a comprehensive strategy approach that enables businesses to embed a circular strategy into their core business strategy and use this concept as a key differentiation factor to improve their resilience, transparently communicate their circularity ambition, and increase shareholder value. This method

provides companies with a foundation from which to launch their strategic journey into the circular economy. CIRCelligence offers actionable, fact-based recommendations that top management can use to steer the business and execute tangible circularity measures. By embedding circular thinking across the whole organization, companies can move beyond isolated lighthouse projects that generate low financial impact and start unlocking the full economic opportunities of the circular economy—€140 billion–200 billion per year in Germany. While CIRCelligence helps companies with their first steps toward circularity, success will depend on a thorough implementation and continuous reevaluation of circular initiatives in order to ensure long-term value creation.

Realistically, the actions of individual companies will not be enough to achieve necessary levels of circularity in a reasonable time frame. The whole business ecosystem will have to change in ways that create suitable conditions for circular companies to thrive and that safeguard the current prosperity of our societies. Regulators can help create favorable settings and incentives to encourage the emergence of a circular society. An example is the EU circular economy action plan of 2020. While each country in the EU can decide how to implement the plan's recommendations, Germany should take a front-runner role to secure its strong international position and create future competitive advantages as an export champion. To do so, Germany first needs to increase transparency on its existing recycling and material recovery instead of continuing to claim high recycling rates of over 80%, when the country actually has reached only 10.4% circularity.

Consumers also have a responsibility to reevaluate and adjust their buying behavior by moving away from redundant ownership models toward product-as-a-service models. Such behavioral change would give companies the right incentives to produce circular products while generating economic benefits for consumers themselves. Individual consumers often underestimate their power within the economic system. Collectively, they are extremely influential and have the ability to reward circular companies directly.

Shareholders and investors can place more weight on long-term consequences of corporate actions and actively push companies to become more circular in order to prevent a deterioration of their assets.

If we want to continue living in thriving economic systems, there is no alternative to reducing our virgin resource consumption and moving toward an economic model that is regenerative by design and based on closed resource loops. Although the pandemic outbreak of COVID-19 has slowed discussions on this topic, it has also demonstrated the great power nature has over humans. To safeguard ecosystem services and natural resources for current and future generations, we need to act without delay. Now is the time to start closing our future resource loops.

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The whole business ecosystem will have to change in ways that create suitable conditions for circular companies to thrive and that safeguard the current prosperity of our societies.



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