



Institute Briefing

Circularity: From Theory to Practice

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Foreword

I am increasingly aware of the limitations of our resources, the urgency of climate change, the pervasive inequity in our societies, and the large-scale change needed to transition business to circular and regenerative models.

One of the solutions we must pursue is a shift away from a business as usual approach that creates unnecessary waste, pollution, and loss of value. We've seen thought leaders and innovative companies taking charge and piloting new products, partnerships, and approaches to circularity in recent years. However, more action at a larger scale is needed, and so we've put together this resource and guide to capture our thinking and learning.

I'm proud to share *Circularity: From Theory to Practice* as a tool for you to use to further your journey on the road to circularity. The report is built on ERM's expertise and experience working with clients over five decades. The report frames the common barriers, enablers, trends, and opportunities in the space, then outlines a four-step process for developing a circular economy strategy along with the key elements to making such a strategy successful.

I'm optimistic about the future we can build using circular economy approaches as a guide, and I hope you'll find sources of inspiration in the frameworks and case studies that follow that you can take further into your own work.



Sabine Hoefnagel

Director of Services, Brand and Communications
ERM

Executive Summary

The Imperative for a circular economy

Growing demand for finite resources and increasing impacts from climate change create a global imperative to decouple the dependence of societal wellbeing and economic growth from the use of natural resources. Yet tangible progress on creating a circular economy at scale is lacking. While business leaders aspire to contribute to a circular economy, many struggle to interpret what participation in the circular economy means in practical terms for their company.

Barriers and enablers

Companies encounter a variety of barriers and enablers as they transition to circular models. These fall into four categories.

- **Organizational:** Almost every aspect of a traditional company is designed for a linear system, from communication to management to production processes.
- **Financial:** Low prices for virgin materials and high upfront investment costs are noted as the most important financial barriers to transitioning.
- **Regulatory:** Current waste and chemical legislation does not support the development and introduction of circular services and products.
- **Technical:** Suggested circular economy solutions often focus on waste and recycling as opposed to products and services designed from the outset with a holistic life cycle understanding.

Trends and opportunities

Several key societal developments will affect the pace of uptake of circular economy thinking and provide opportunities for companies to speed the adoption of circular economy models.

The regulatory landscape is a key driver. Regulatory developments in some parts of the world provide incentive to participate in the circular economy. In other parts of the world, the lack of regulatory drivers may cause the circular economy to develop more slowly. Overall, the lack of consistent regulatory impetus means many companies are less likely to engage in the circular economy unless driven to do so by one or more of the following.

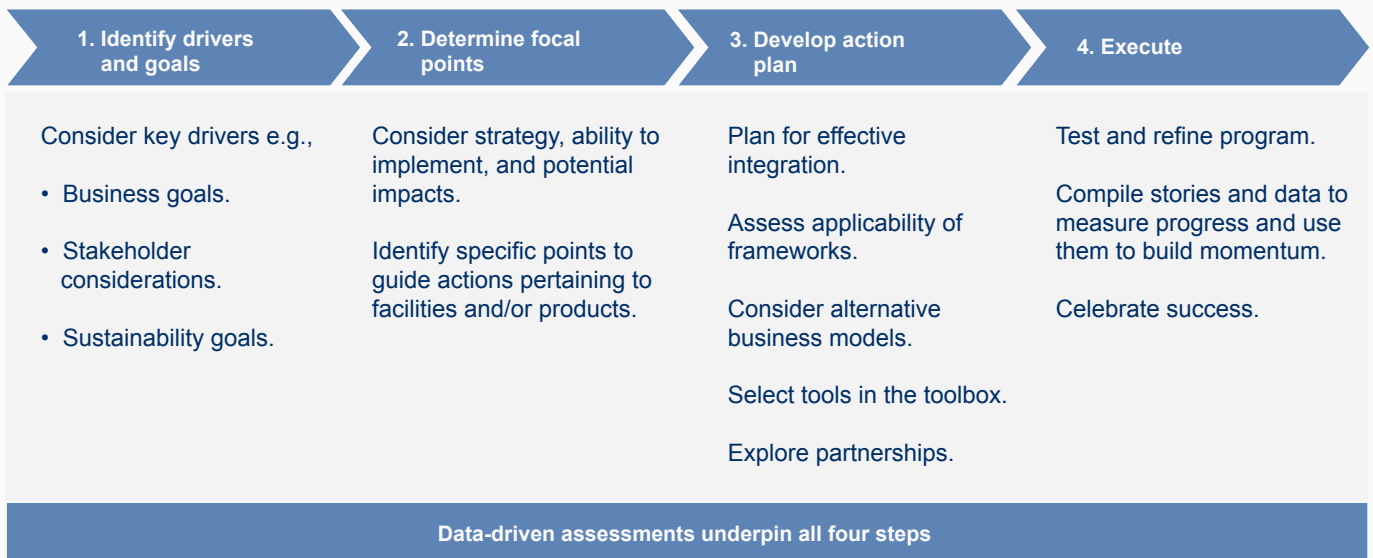
- **Resource scarcity:** Resources of certain crucial metals have become increasingly scarce. Such resource scarcity is not only a challenge to business as usual, but can limit the development of new solutions for sustainability such as solar photovoltaics, electric vehicles, and wind turbines. Circular strategies can provide a higher degree of independence from scarce resources as well as competitive advantage, and they can accelerate the transition to a low carbon economy.
- **Climate change:** Climate change is the greatest sustainability challenge presently faced by society. Companies will face increased pressure over time from the public and government to take more action to fight climate change. Implementing circular economy principles is an important way to contribute to reducing emissions.
- **Volatile supply chains and markets:** The COVID-19 pandemic and the climate crisis have added to the fragility of global supply chains and have had significant impacts on the availability and prices of materials and goods. Volatile markets coupled with resource scarcity often lead to price increases for virgin raw materials. This uncertainty coupled with increasing costs can help make circular strategies more economically attractive.

Developing a circular economy strategy

There's no one-size-fits-all circular economy strategy. This briefing presents a four-step approach that has been tested and honed through work with ERM clients. This approach can help your company build an effective circular economy strategy aligned with your business strategy, which also produces environmental benefits.

“ This briefing presents a four-step approach that has been tested and honed through work with ERM clients. ”

Developing and Implementing a Circular Economy Strategy



Keys to success

ERM's circular economy specialists have observed several common keys to success when implementing the steps in our four-step framework.

1. Build executive support and integrate circularity into business strategy.
2. Integrate into processes and build corresponding tools for implementation.
3. Measure and celebrate progress to reinforce culture change.

Many of the barriers to circularity are falling as enabling factors and precedents grow. An effective circular economy strategy begins with careful consideration

of strategic objectives and advances through practical, data-driven attention to methodology. Effective programs connect cross-functional teams and embed circularity deep within routine processes, allowing for process change and improvements over time. Early adopters have shown that change to more circular products and operations is not only imperative but possible.

1. Introduction

Growing demand for finite resources and increasing impacts from climate change create a global imperative to decouple the dependence of societal wellbeing and economic growth from the use of natural resources. Yet tangible progress on creating a circular economy at scale is lacking. This Introduction explains why a circular economy is crucial and how this briefing aims to support companies in creating circular business strategies.

The imperative for a circular economy

As shown by growth in the Earth's "global material footprint," current patterns of consumption cannot be sustained.¹ This metric, which characterizes the amount of primary materials needed to meet essential needs for food, clothing, water, shelter, and infrastructure, grew by 17 percent in just seven years between 2010 and 2017.² While demand grows, supply is increasingly limited. For example, analysis of mineral reserves indicates that 10 essential metals are "very scarce" (< 20 year supply) and 11 "scarce" (20 – 40 year supply).³

Increasing efficiency helps, but does not suffice. Economies must shift from a linear model to a circular system in which deliberate actions are taken to minimize waste and pollution and to design products for reuse. This shift will require drastic changes. Consumers must adjust their expectations; businesses must innovate to overcome technological and cost limitations; and regulators will have to create new frameworks to drive change. In short, we must move to a circular economy (see Box 1).

The rate of progress

Consider the trends illustrated in Figure 1 based on data from 2012 to 2020. Public interest in the circular

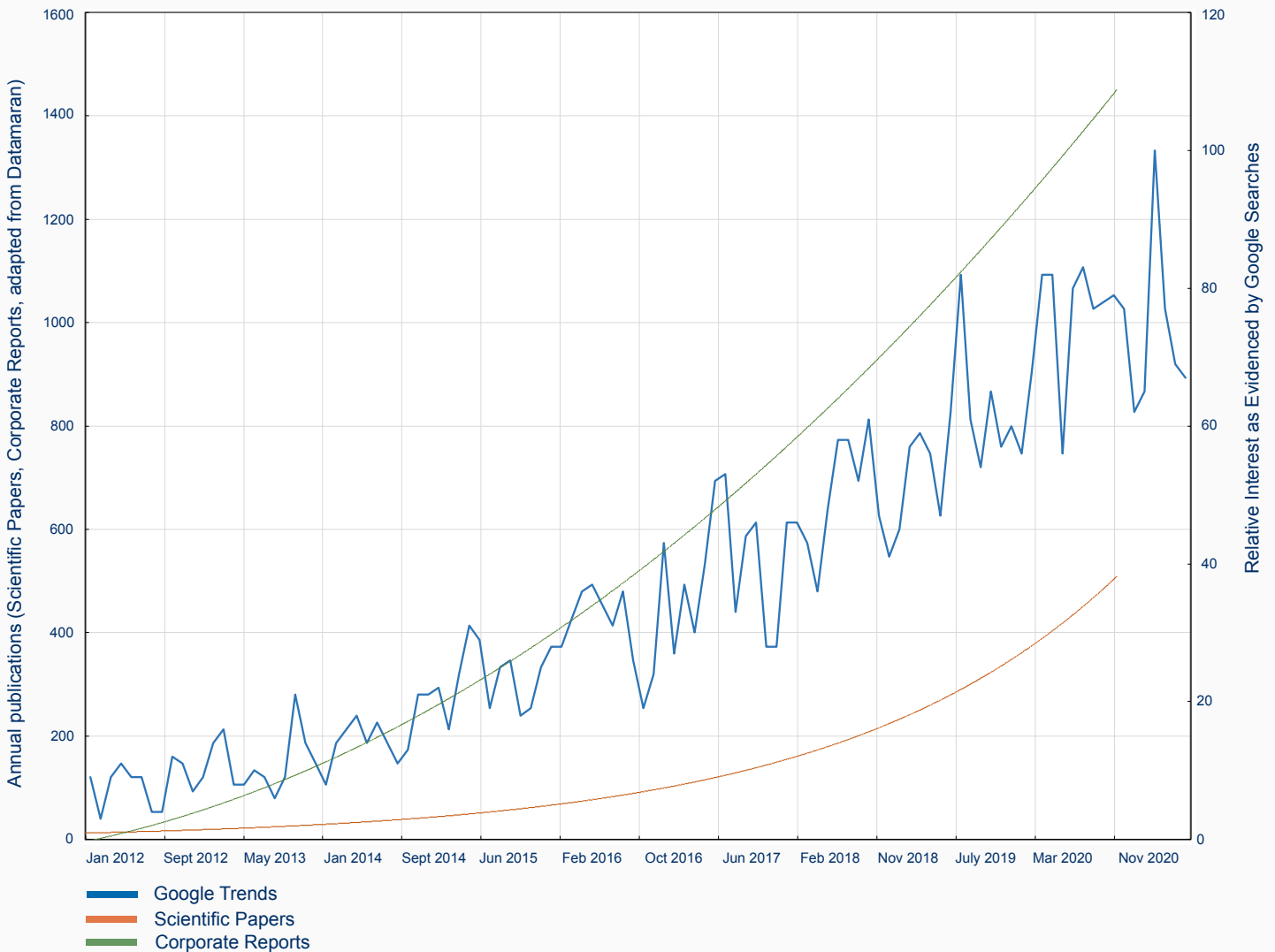
economy, expressed as a function of Google searches, has accelerated markedly in the last decade.⁴ Heightened public interest is significant as it can drive consumer behavior and the development of new regulations.

Corporate interest has also grown, as evidenced by the growing number of citations of the phrase 'circular economy' in corporate reports retrieved using Data-maran.⁵ Academic interest has increased too, with the number of publications on the circular economy increasing markedly in the last 10 years.⁶

Box 1: Defining the Circular Economy

The European Commission (EC) describes the concept as one "where the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste minimized."⁷ The Ellen MacArthur Foundation adds action verbs to the EC's passive construction: "A circular economy is based on the principles of designing out waste and pollution, keeping products and materials in use, and regenerating natural systems."⁸

Figure 1: Rising Interest in the 'Circular Economy,' 2012-2020^{9,10,11}



Despite evidence of increased interest, however, progress remains slow. Business leaders might fully understand the urgency of the issue and aspire to contribute to a circular economy, but many struggle to interpret what participation in the circular economy means for their company. They may not know how to begin, let alone to see the implementation and transition through in a way that brings value to their business and the planet.

This briefing demystifies concepts and offers practical perspectives on building circularity considerations into business strategy. The pages that follow explore the barriers and enablers to companies aligning business strategies with circularity, then provide practical guidelines for doing so. Finally, this briefing describes keys to success based upon the authors' experience working with private sector clients to integrate circularity into their operations.

“ Business leaders might fully understand the urgency of the issue and aspire to contribute to a circular economy, but many struggle to interpret what participation in the circular economy means for their company.”



2. Evolutions in circular economy thinking

For two centuries, much of the world learned to think linearly about the use of resources: extract, use, and throw away. But rising societal expectations and limits on available resources demand that we learn to think and act in circular fashion. In this section of the briefing, we explore the evolution of circular thinking and the forces that hinder or support this development.

From ‘take-make-waste’ to circularity

The Industrial Revolution beginning in 18th century Britain and spreading globally led to unprecedented urbanization, to the emergence of new family structures and forms of labor, and to mass production of goods characterized by a ‘take-make-waste’ approach to resource use. While this led to prosperity and wealth for many, it also caused environmental degradation and pollution on a new scale.

In response, the environmental movement emerged in the 19th century, moving slowly at first, then growing rapidly after 1960. Catalyzed by the growing knowledge that most resources on earth are finite, this movement started to question the linear economy. Coca-Cola, for example, was pioneering the practice of life cycle thinking as far back as 1969 (see Case Study 1).

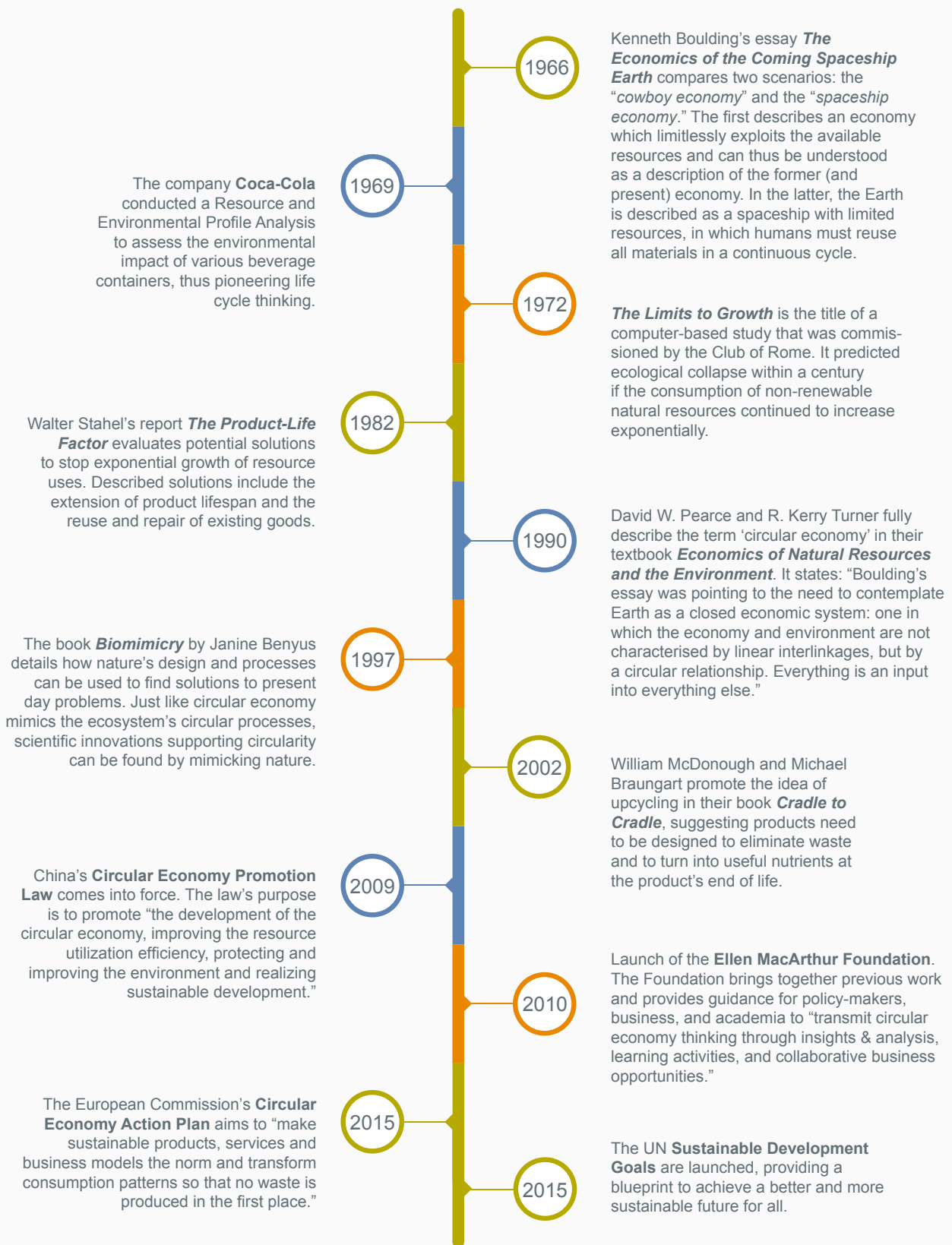
Key milestones in this evolution are shown in Figure 2. The 1972 report *The Limits to Growth* is a prominent example of an early study illustrating the potentially dire consequences of an economy relying on an increased demand for finite resources. Potential solutions to this dilemma were the focus of later works, such as Walter Stahel’s report *The Product-Life Factor* in 1982, in which the concepts of product lifespan extension, reuse, and repair of goods were introduced. With the groundwork for the idea of a circular economy prepared thanks to these and other contributions, it was fully described in 1990 by David W. Pearce and R. Kerry Turner. Today, the concepts of the circular economy are widely accepted as one of the main pillars to achieve the UN Sustainable Development Goals.^{12,13}

Case Study 1: Coca-Cola Pioneers Life Cycle Thinking

Coca-Cola pioneered life cycle thinking in 1969 with a Resource and Environmental Profile Analysis (REPA) that quantified the energy, material, and environmental consequences of the entire life cycle of a Coca-Cola beverage container from the extraction of raw materials to disposal. The analysis considered refillable bottles, plastic bottles, and cans.¹⁴ As described in a 1996 retrospective, “the Coca-Cola study was never published because of its confidential content, but was used by the company in the early 1970s as an input into their many packaging and business decisions.”¹⁵

One of the interesting outcomes of the Coca-Cola work was that they gained a ‘comfort’ with the idea of switching from glass to plastic bottles. Previously, plastics had a reputation as somewhat of an environmental villain, but the REPA study showed that this reputation was based upon misunderstanding. But over time understanding evolves. The volume, use, and disposal of products change, as do environmental concerns. Environmental activists now decry the use of plastic Coke bottles because of the resulting plastic waste.¹⁶ In response, Coca-Cola has observed that eliminating plastic for glass or aluminum would increase the business’s carbon footprint and weaken sales.¹⁷ As this case study illustrates, circularity is not always straightforward and often entails tradeoffs.

Figure 2: Development of Circular Economy Concepts^{18,19,20,21,22,23,24,25,26,27,28}



Barriers and enablers

Considering the long history of studies and works on the concept of a circular economy, and the rapidly increasing threat of climate change, one would expect to see the transition from the linear to the circular economy in full progress. However, according to the *Circularity Gap Report 2021* produced by the Platform for Accelerating the Circular Economy (PACE), the global economy was only 8.6 percent circular in 2020, slightly decreasing from 9.1 percent in 2018.²⁹ The report authors estimate that the global economy must be at least 17 percent circular to close the greenhouse gas (GHG) emissions gap by 2032 and thereby stay below the maximum 2 °C threshold for temperature rise targeted by the Paris Agreement.³⁰

Companies encounter a variety of barriers and enablers to the circular economy transition. Figure 3 summarizes those most commonly listed in recent publications. These fall into four categories: organizational, financial, regulatory, and technical.

- **Organizational:** A survey by Deloitte and Utrecht University from 2017 showed that businesses rank company culture as the greatest barrier to contributing towards a circular economy.³¹ Almost every aspect of a traditional company is designed for a linear system, from communication to management to production processes. A change in company culture requires a strong commitment by senior management that translates into a long-term business strategy coupled with a clear vision plus well-defined and achievable targets.
- **Financial:** Low prices for virgin materials and high upfront investment costs are seen as the most important financial barriers to transitioning to circular business models.³² Companies also hesitate to invest in new business models while consumer awareness and market readiness are lacking. They become even more hesitant if there is a risk that such investment might drive self-cannibalization. However, as described later in this report, the increasing volatility of global markets as well as sustainable financing initiatives such as the EU Taxonomy provide incentive to change to innovative business models that depend less on finite resources, promote the circularity of products and services, and produce less waste.

- **Regulatory:** Current waste and chemical legislation was designed for linearity and does not provide a supportive framework for the introduction of circular services and products. In some cases, regulations even prohibit the use of recycled materials or the exchange of waste.³³ However, the regulatory landscape is changing, as will be discussed later in this report.
- **Technical:** Suggested circular economy solutions often focus on waste and recycling.³⁴ In many cases, however, recycling consumes a great deal of energy and leads to decreased quality of materials. Instead, when designing products and services, a holistic life cycle understanding must be included from the start to prolong product life, minimize the use of materials and energy, and avoid the generation of waste.

A lack of awareness and understanding of circularity underlies all four categories of barriers.



Businesses rank company culture as the greatest barrier to contributing towards a circular economy.



“Change to a circular economy isn’t easy, but the imperative to design products and packaging in a circular manner is critical. Customer expectations, shareholder demands, and regulatory pressures to participate are growing. I’ve found that designing out waste and pollution and putting materials back into commerce is not only good for the environment, but generates cost savings too.”

- Al Iannuzzi, Ph.D., VP Sustainability Estée Lauder companies, author *Greener Products: The Making and Marketing of Sustainable Brands*, CRC Press 2017

Figure 3: Barriers and Enablers to Circularity^{35,36,37,38,39,40}

BARRIERS		ENABLERS
<ul style="list-style-type: none"> • No leadership commitment. • Organisational silos. • Circular economy not integrated in strategy. • Process, operation, and management system designed for linearity. 	ORGANIZATIONAL	<ul style="list-style-type: none"> • High-level commitment. • Long-term business strategy. • Personal drive of staff. • Reporting and KPIs. • Supply chain partnerships. • Public pressure.
<ul style="list-style-type: none"> • High upfront investment costs. • Low virgin material prices. • Unconvincing business cases. • Lack of financial incentives. • Cost of environmental degradation not considered in product price. 	FINANCIAL	<ul style="list-style-type: none"> • Sustainable financing. • Investor pressure. • Customer / consumer pressure. • New business opportunities. • Competitive advantage.
<ul style="list-style-type: none"> • Lack of knowledge and skills. • Lack of LCA and design thinking. • Complex assessment processes. • Lack of efficient remanufacturing and recycling options. 	TECHNICAL	<ul style="list-style-type: none"> • Up- and reskilling of workforce. • International standards. • Implementation of LCA approaches. • Exchange with stakeholders, supply chain, and competitors.
<ul style="list-style-type: none"> • No consistent regulatory framework. • Current waste and chemical legislations designed for linearity. • Lack of global standards. 	REGULATORY	<ul style="list-style-type: none"> • Consistent regulatory frameworks. • Education and training. • Aligning and simplifying connected legislation. • Increased regulatory pressure.

Trends and opportunities

Some of the barriers discussed earlier present challenges that will require extensive effort to overcome. Conversely, some will spur the uptake of more circular economy business models.

Key societal developments will also affect the pace of uptake of circular economy thinking and provide opportunities for companies to speed the adoption of circular economy models.

The regulatory landscape is a particularly crucial driver. Regulatory developments in some parts of the world provide incentive to participate in the circular economy. In other parts of the world, the lack of regulatory drivers may cause the circular economy to develop more slowly. Three examples from major world economies follow.

- The **United States** has lagged some other regions in developing national legislation or policy on circularity. No U.S. federal laws or regulations currently embody circularity. The U.S. Congress has passed two laws related to specific concerns with plastic waste, the *Microbead-Free Waters Act of 2015* and the *Save Our Seas Act*. Various states have passed laws pertaining to electronics takeback schemes, packaging, chemical bans, and other fragments of circular thinking. This scattershot approach to developing a national circular economy strategy in the U.S. is not anticipated to change quickly.

- The **European Commission's Circular Economy Action Plan**, first published in 2015 and revised in 2020, now forms one of the building blocks of the European Green Deal. The *Action Plan* introduces legislative and non-legislative measures with the aim to “make sustainable products, services and business models the norm and transform consumption patterns so that no waste is produced in the first place.”⁴¹ Further, the EU Taxonomy regulation will provide financial incentives, as it “aims to enable the financial system to guide investment decisions into a more sustainable direction and thus accelerate the transition to a circular economy.”⁴²

- **China** was the first country to include circular economy principles on a regulatory level with the introduction of its *Circular Economy Promotion Law* in 2009.⁴³ Article 1 of that law states that its purpose is to promote “the development of the circular economy, improving the resource utilization efficiency, protecting and improving the environment and realizing sustainable development.”^{44,45} However, the progress of transition is slow, mainly focusing on resource intensity, waste intensity, waste recycling rate, and pollution treatment rate, thus falling short of holistic circular economy advancement.

Although regulations driving the circular economy are emerging unevenly throughout the world, the EU's *Circular Economy Action Plan* will likely have a global influence, as all companies placing products on the EU market need to comply with its regulations. International companies might drive to implement the EU circular economy actions as the highest common denominator for their global markets. However, overall the lack of consistent regulatory impetus means many companies will not engage in the circular economy unless driven to do so by one or more of the other factors discussed below.



Regulatory developments in some parts of the world provide incentive to participate in the circular economy. In other parts of the world, the lack of regulatory drivers may cause the circular economy to develop more slowly.

1 Resource Scarcity

Researchers have warned for decades that finite planetary resources will limit economic and societal growth unless we take action.⁴⁶ Data cited in the Introduction to this report showed, for example, that resources of certain crucial metals have become increasingly scarce. Such resource scarcity is not only a challenge for business as usual, but can limit the development of new solutions to sustainability challenges.

To meet the Paris Agreement target, for instance, many countries are investing in emerging low carbon technologies such as solar photovoltaics, electric vehicles, and wind turbines. All these technologies depend heavily on certain metals. Production of low carbon technologies alone may demand more than 600 million tonnes of these materials through 2050.⁴⁷ Some of these metals are already very scarce.⁴⁸ Add to this scarcity the volatile geopolitics that affect supply chains, and it becomes clear that supply from conventional sources will become even more unstable.

Recycling can preserve some raw materials but offers no panacea. Using electronic waste as a secondary resource for the recycling of metals will not be sufficient and, in many cases, is not very efficient. Instead, circular economy strategies are needed that positively impact lifespan extension, reuse, and remanufacturing of products.⁴⁹ These strategies will provide a higher degree of independence from scarce resources as well as competitive advantage, and will thus accelerate the transition to low carbon economies.

2 Climate change

Climate change is the greatest sustainability challenge presently faced by society. Weather extremes caused by human-induced climate change have become more frequent.⁵⁰ GHG emissions must be reduced to zero by 2050 to decelerate climate change and meet the targets of the Paris Agreement. *Responding to Humanity's Code Red*, the 2021 GlobeScan / Sustainability Institute by ERM survey on climate progress, found that sustainability experts see public engagement on climate as lagging.⁵¹ However, recognition of this imperative amongst the public is growing; the largest survey of public opinion to date on climate change – *The Peoples' Climate Vote* – revealed that a majority of people worldwide see climate change as an emergency and found respondents calling for policies supporting green businesses and jobs.⁵²

Companies will face increased pressure over time from the public and government to take more action to fight climate change. One study found that existing and emerging technologies can help to halve the 45 percent of emissions that come from industry, agriculture, and land use. However, substantial GHG emissions will persist even after this effort. The best chance to eliminate the remaining emissions is by implementing circular economy principles.⁵³



Circular economy strategies are needed that positively impact lifespan extension, reuse, and remanufacturing of products. These strategies will provide a higher degree of independence from scarce resources as well as competitive advantage, and will thus accelerate the transition to low carbon economies.

3 | Volatile supply chains and markets

The COVID-19 pandemic and the climate crisis have added to the fragility of global supply chains and have had significant impacts on the availability and prices of materials and goods. Extreme weather events will become more frequent and may interrupt supply chains more often, thereby leading to unpredictable shortages and price fluctuations.⁵⁴

One example is the massive deep freeze in the U.S. early in 2021, which resulted in several power outages in the Gulf region, the area in which almost all U.S. petrochemical and feedstock production for plastics manufacturing takes place. These outages led to manufacturing shutdowns with global impacts because the production of base chemicals for plastics was offline, all of which temporarily halted plastic production.⁵⁵ Plastic prices globally skyrocketed due to this shortage in supply.

Volatile markets coupled with resource scarcity will inevitably lead to price increases for most virgin raw materials. This uncertainty and increasing cost will help make circular strategies more economically attractive.

Public pressure, regulatory developments, increasingly depleted resources, and fragile supply chains will all help accelerate the transition to a circular economy. Governments and companies that react to these developments early and effectively will benefit. However, turning this into a concrete strategy within a company is often daunting. The next section of this briefing describes ways in which to meet this challenge.



Public pressure, regulatory developments, increasingly depleted resources, and fragile supply chains will all help accelerate the transition to a circular economy. Governments and companies that react to these developments early and effectively will benefit.

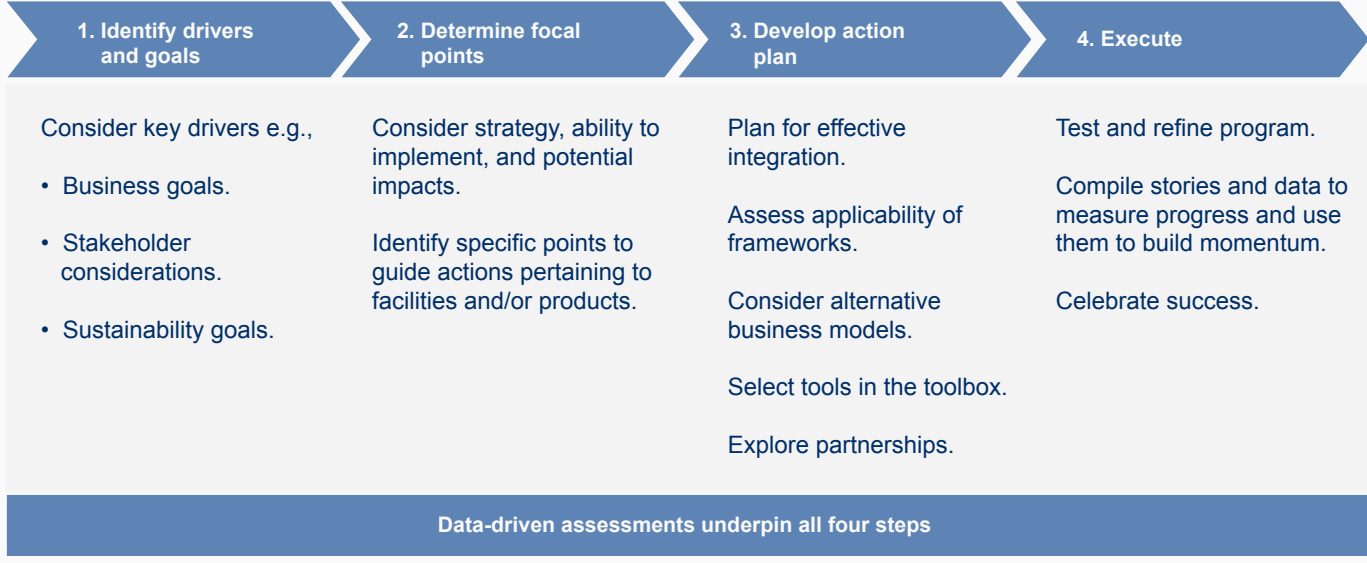


3. Developing a circular economy strategy

There’s no one-size-fits-all circular economy strategy. Search for models of effective strategies and measures, and you will find a bewildering array of choices online and otherwise. In this section we outline a four-step approach that can cut through this fog and help your company build an effective circular economy strategy aligned with your business strategy, which also produces environmental benefits.

The four-step approach illustrated in Figure 4 has been tested and honed through work with ERM clients. Each of the four steps is further described below.

Figure 4: Developing and Implementing a Circular Economy Strategy



Step 1: Identify drivers and goals

A company's strategy begins at the intersection between the defining precepts of the circular economy and its own business and sustainability goals. In essence, that means thinking deeply about the company's identity as well as who it serves and how, then developing circularity goals.

Table 1 illustrates how business goals, stakeholder considerations, and a commitment to deliver in line with macro sustainability goals can provide a foundation for developing your company's circular economy strategy.



A company's strategy begins at the intersection between the defining precepts of the circular economy and its own business and sustainability goals.

Table 1: Foundations for Strategic Goals in the Circular Economy: Illustrative Concepts

Business Goals	Stakeholder Considerations	Sustainability Goals
<ul style="list-style-type: none"> • Bring new products to market. • Maintain high volume sales, seek market advantage, and win new customers. • Expand or renovate facilities. • Capture return on investments made to minimize resource use or waste generation. • Meet or exceed industry norms. • Improve brand positioning against competitors. 	<ul style="list-style-type: none"> • Customer expectations (especially younger customers) for greener chemistry, elimination of certain chemicals, reduced Scope 3 emissions, etc. • Investor expectations and initiatives. • Current and emerging regulatory requirements affecting use of chemicals, management of waste, and imperatives for recycling. 	<ul style="list-style-type: none"> • Quantitative company goals to achieve net zero targets, conserve resources, or reduce GHG emissions and other wastes. • Alignment with the goals of the Paris Agreement. • Commitments to UN Sustainable Development Goals.

One ERM client in the consumer goods sector first sought to build a circular economy strategy to address the numerous questions about environmental sustainability and corporate responsibility being posed by investors. As our client explored the development of a circular strategy, it also became apparent that younger customers interested in sustainability were a relevant driver supporting the business case for a circular economy program, because, for the products

in question, brand loyalty built early in life could translate to decades of sales. In addition to these external forces, the company also found another driver toward the design of a circular economy strategy to be its own overall environmental sustainability goals given analysis of the company's manufacturing footprint showed the potential for improvement in water and energy use. It also showed the potential to minimize generation of GHG and solid waste.

Step 2: Determine focal points

A company's strategic objectives provide the foundation and impetus for developing a circular economy strategy. The next step is to turn these strategic objectives into action by identifying focal points where actions can be taken.

Focal points must be:

- Aligned with strategic objectives.
- Capable of delivering measurable impact.
- Cost-effective at least in the long term.
- Technically feasible.
- Reasonably implementable and appropriate for sustained effort.

Focal points will typically pertain to facility operations or products, and may encompass both new and old. In practice, it can be easier to make new facilities or new products circular than existing ones. Retrofits to existing facilities and operations may be limited by regulatory requirements, siting concerns, or cost. Focal points often fall into one or more of the following categories.

- Addressing regulatory requirements.
- Responding to customer requirements.
- Seeking more sustainable sourcing.
- Using greener chemistry.
- Improving resource conservation.
- Reducing GHG emissions or other forms of pollution.
- Minimizing end-of-life impacts.
- Increasing handprint (see Box 2).

Box 2: Handprinting

Actions in the circular economy can go beyond limiting harm and actually contribute to social or environmental good. Playing on the common terminology that labels accounting for resource demand or generation of pollution as 'footprinting,' the practice of accounting for positive contributions is known as 'handprinting'.

The table below illustrates how some of the companies ERM is working with on circular economy challenges have developed points of focus for their efforts.

Table 2: Focal Points for Circularity

Aspect of Circularity*	Illustrative Focal Points			
	Existing Facilities and Operations	Existing Products	New Facilities and Operations	New Products
Design out waste and pollution	<p>Optimize water use in operations, facilities, and landscaping.</p> <p>Minimize facility waste and increase recycling, perhaps achieving zero waste to landfill.</p>	<p>Review long-standing manufacturing processes to identify potential ways to reduce waste generation.</p> <p>Assess the value chain (up and downstream) for distribution and transportation efficiencies.</p>	<p>Assess locations and optimize design to minimize energy and water use.</p> <p>Adopt Leadership in Energy and Environmental Design (LEED).</p>	<p>Evaluate and optimize circular characteristics during New Product Development.</p>
Keep products and materials in use	<p>Embed mindset of repairing rather than replacing.</p>	<p>Develop product takeback programs or service models that shift revenue to maintenance.</p>	<p>Incorporate and maintain features designed for longevity and flexible adaptation to changing demands.</p>	<p>Design for:</p> <ul style="list-style-type: none"> • Longevity. • Ease of disassembly / replacement of parts. • Recyclability.
Regenerate natural systems	<p>Adopt facility maintenance and landscaping protocols aligned with circularity.</p>	<p>Assess supply chain and potential to incent suppliers for sustainable practices.</p>	<p>Site and design to minimize impact on and, if possible, to regenerate natural systems.</p>	<p>Consider sourcing of raw materials and vendor requirements.</p>
	<p>Enter credit programs to offset environmental impacts.</p>			

*Aspects of circularity as per the Ellen McArthur Foundation’s description of elements of the circular economy; see <https://www.ellenmacarthurfoundation.org/circular-economy/concept>.

Step 3: Develop action plan

Successful circular economy strategies often require changing business models. Business model shifts are most effective when they reflect thoughtful, data-driven analysis of the potential impact on and implications for the financial health of the business. In this step, we describe practical considerations and illustrate by example how some companies have defined methodologies for action.

Plan for effective integration

A company focused on achieving gains in the circular economy needs a practical plan of action. But making circularity ‘business as usual’ requires thoughtful efforts in training and business integration.

There may for instance be a need to modify procedures for new product development. Designers may need tools to evaluate the potential impact of decisions under consideration, for example estimating the effect on GHG emissions, resource use, or waste generation of their materials choices, then balancing those decisions against cost of goods sold.

The tools themselves must be relatively easy for company team members to use, accurate and reliable, and understandable to stakeholders inside and outside the company. Sales and customer service teams must be primed for conversations with customers and ready to convey their feedback. Purchasing and supply chain management teams must be engaged so that circularity requirements flow into supplier contracts and so that appropriate data can be collected.

Assess applicability of frameworks

An existing framework can provide a scaffold on which to build a program and can add external credibility. Some examples are provided in Table 3. These often encompass a quantitative assessment of resource use and waste generation and/or monetization of environmental impacts.



A company focused on achieving gains in the circular economy needs a practical plan of action. But making circularity ‘business as usual’ requires thoughtful efforts in training and business integration.

Table 3: Sample of Circularity Frameworks

Originator and Framework	Description
World Business Council for Sustainable Development - Circular Transition Indicators ⁵⁶	Score reflects quantitative calculations of resource use and waste minimization. Calculation methodology applicable across industries and value chains as a means to assess, improve, and monitor improvements in circularity.
World Business Council for Sustainable Development - Portfolio Sustainability Assessment method (WBCSD PSA) ⁵⁷	PSA refers to the orientation of an overall product portfolio towards improved sustainability performance. This framework provides a set of quality criteria a company can use to develop a PSA methodology or to improve the quality and consistency of a current approach.
Ellen MacArthur Foundation - Circulytics ^{58,59}	A Circulytics score reflects company policy, position, and processes. It includes some calculations related to resource use. The on-line scoring algorithm calculates a company’s overall grade, ranging from A to E. Output includes insights tailored to score.
Kering - Environmental Profit and Loss (EP&L) ⁶⁰	Method to measure and monetize environmental impacts in company operations and across the entire supply chain so that they can be effectively managed. Methodology developed for the fashion industry based on principles of the Natural Capital Protocol, which itself can apply across varied industries. ⁶¹

Consider alternative business models

Alternative business models often represent a change in thinking about consumption, for example, adding services to a product line, leasing rather than selling, or changing relationships with customers or partners in value chain. Case studies 2 and 3 describe how two industry leaders created models to design out waste and pollution and keep products and materials in use in ways that can allow their businesses to thrive.

Select tools in the toolbox

Making profound changes to align business strategies with circular principles requires the use of practical tools to gauge potential impacts and guide action. The right tools to effect a circular economy strategy can depend upon the shifting requirements of customers and, for many sectors, the retail outlets through which they sell their products. Some tools are embedded within frameworks (Table 3). A few common tools are described below.

- **Life Cycle Assessment:** Life Cycle Assessment (LCA)⁶² enables the user to evaluate the effects of making and using products throughout their life cycle. LCA is essential, for instance, to quantifying Scope 3 GHG emissions. But an LCA will not suit every company's need. Data may not be available to support the model, the endpoints may not fully reflect the strategic objectives, or the process may be too expensive and lengthy to implement at scale. In such cases, it may make sense to perform a screening or streamlined LCA, or to use an alternate tool.



Alternative business models often represent a change in thinking about consumption, for example, adding services to a product line, leasing rather than selling, or changing relationships with customers or partners in value chain.

Case Study 2: REI's Extended Life Cycle

REI describes how it extends the life cycle of the products that it makes and sells to the benefit of many customers.

“The thinking is that if we can keep outdoor gear and clothing in use for longer, we'll get the most out of the Earth's resources that we've already made into stuff.

“But just how exactly is REI doing this? By selling Used Gear and Rentals. In creating solutions to allow people the option to buy used gear or rent gear they might not take into the wilderness that often, the co-op is hoping to help reduce the environmental and economic impact of outfitting.”⁶³

Case Study 3: HP's Instant Ink

Technology company HP has shifted to a service model with its Instant Ink program. Customers can sign up to a subscription service that automatically delivers printer ink cartridges based on a monthly fee. HP also provides mailing supplies to return used cartridges for recycling. HP touts the benefits to customers of convenience, cost savings, and responsible recycling.⁶⁴ This circularity program is data driven. A Life Cycle Assessment (LCA) reportedly showed that “compared to transactional retail systems, HP Instant Ink reduces GHG emissions by 73%, improves resource efficiency by 73%, and lowers water use by 70%.”⁶⁵

- **Certifications:** Hundreds of different certifications can convey participation in the circular economy. A technology sector company whose target customers value the EPEAT Ecolabel,⁶⁶ for example, will likely identify this ecolabel early in its circularity journey and design key products to meet the standard. It's important to note, however, that while these are important tools, effective participation in the circular economy requires more than simply choosing a tool such as an ecolabel. Without business model innovation, a certification alone is unlikely to support lasting and meaningful change. Truly integrating circularity requires systems thinking and integration into one's business strategy.
- **Custom made tools:** Some circumstances call for custom-made tools tailored toward the business and its focal points, as illustrated by Case Study 4.

Explore partnerships

Sometimes a step-change in circularity requires bold partnerships, as effecting far-reaching change can require collaboration to transform long-established practices. Some industry consortia have created standards and scoring methods for products. Others have aligned around changing the nature of the products themselves. Detergent manufacturers, for example, agreed to move to compact powders or liquids and phase out standard products for clothes washing, reducing production, packaging, transport, and disposal impacts.⁶⁷



Sometimes a step-change in circularity requires bold partnerships, as effecting far-reaching change can require collaboration to transform long-established practices.



"Ecolabels can quickly identify the circularity of a product. As the world transitions from our linear "take-make-waste" model to a circular "repair-reuse-reintegrate" model, leading Fortune 500 companies and governments around the world are using the EPEAT Ecolabel in their procurement specifications to speed their transition to a circular economy."

- Nancy Gillis, CEO, Global Electronics Council

Case Study 4: ERM's Sustainable Clothing Action Program (SCAP)

ERM's Sustainable Clothing Action Program (SCAP), developed for work with fashion brands and fiber manufacturers, provides a model for evaluating the potential sustainability impact of various fibers used in clothing. Similar to an LCA, but operating at a portfolio level rather than at product level, this tool allows the user to identify places in the supply chain where sustainability issues might arise for a particular fiber. Over 90 fashion companies representing more than 48 percent of UK retail sales by volume signed up to the Sustainable Clothing Action Plan, which incorporates this tool.⁶⁸

The SCAP tool quantifies the total impact of a business' portfolio of products that are fiber-based. The tool allows an assessment of which product types contribute the most to environmental impacts, and which impacts are associated with which fibers. The assessment identifies hotspots as well as providing a quantification of the baseline impact profile. This allows:

- The development of an overall reduction strategy.
- The appraisal of the effect of portfolio development and growth.
- Product design and supplier engagement to be informed from a sustainability perspective.

Step 4: Execute

Urgent action is needed to combat climate change and re-think the use of resources. But business change takes time and profound commitment. This step considers the process of making lasting change.

Shifting a business to more circular approaches requires methodical cross-functional effort. Effective teams typically include participants from research & development, purchasing, marketing, operations, and sustainability / product stewardship. A vision of circularity that originates with a core team must expand to capture the imagination and commitment of people throughout the organization.

Many of our clients start small with a single product line or in one division. Pilot testing ideas allows teams to refine their approach. Just as important, it generates stories and data that help to accelerate progress. Stories win hearts, while data win minds, letting success build upon success. Companies that capture the meaning of circularity to customers with stories create excitement, especially when the stories speak to customers' own goals. Calculating impact on GHG emissions or other environmental gains builds credibility and shows progress against key performance indicators (KPIs). Conveying progress builds momentum internally and externally. And as momentum builds, leading companies are able to refine and grow their programs.

The experiences of early adopters of circularity programs offer insights into implementation, as described in Case Studies 5 and 6 below.



Conveying progress builds momentum internally and externally.

Case Study 5: Growing a Program Linking Circularity and Innovation at Clariant

Clariant launched its EcoTain® program in one business unit in 2009. Long before the term 'circular economy' was in wide use, this label designated products that used fewer resources and had lower impacts. Clariant extended the program company-wide in 2015 and incorporated a product scoring system. The Portfolio Value Program (PVP) used to select EcoTain® products reflects 36 criteria covering social, environmental, and economic dimensions.⁶⁹

Insights gained from the EcoTain® program include:⁷⁰

- Initial screening criteria need to be tested and refined before broad use.
- Assessment of product sustainability should reflect not only the negative impacts but also the 'handprint' or social and environmental benefits of the product.
- Implementation required methodical tactics for: team selection; compilation of baseline data; integration into the new product development process; and the development of KPIs.
- Credibility requires a quality control process and external perspective.

As of 2020, Clariant had screened 76 percent of its continuing operations' portfolio for sustainability performance, and 67 percent met Clariant's own sustainability definition.⁷¹ The program continues to evolve. In the decade since the program originated, EcoTain® has grown to be part of the company's innovation identity.

Case Study 6: Reverse supply chain management and the practical side of circularity

Electronic waste or E-waste is a growing issue for all manufacturers and users of electronics. A global technology client of ERM's sought to improve transparency around the management of materials recovered from its products at end-of-life. Mismanagement of E-waste could cause significant business risk for this client due to lapses in collection, management, security, and disposal.

Reverse logistics in the downstream supply chain is a key building block of the circular economy, as optimizing product takeback programs is a key practice in improving circularity. ERM worked with its tech client to develop a global vendor audit program focused on responsible materials recovery through enhanced stakeholder engagement, materials tracking, and downstream due diligence. As well as leading to efficiencies in tracking recovered materials and making audit time more efficient, the client reduced overall takeback program costs by 15 percent and is able to better inform business stakeholders making key decisions about recycling partners as they work to establish a circular economy framework.



4. Keys to success

ERM's circular economy specialists have observed some common keys to success when implementing the steps described earlier in this briefing. This section summarizes these lessons in three thematic areas.

1. Build executive support and integrate circularity into business strategy

- ✓ Build executive support early. Without such support programs flounder.
- ✓ Build acceptance, commitment, and finally enthusiasm across functions. Engagement takes time. Setbacks occur when crucial players are not engaged.
- ✓ Build a data-driven foundation that reflects the values of the company and its customers as well as broader societal perceptions. Moving too quickly to define the company's focus in the circular economy without data risks later irrelevance or results that do not deliver business or environmental value.
- ✓ Define company goals for improvement. Ensure metrics, goals, and results are emphasized throughout the organization, including its highest ranks, and translated to suppliers through contractual agreements.
- ✓ Manage circularity as a business program. 'Passion projects' that rely too heavily on voluntary efforts by internal teams or suppliers often implode without business support and resources across business functions. Ground circularity programs in a clear-eyed recognition of costs.

2. Integrate into processes and build corresponding tools for implementation

- ✓ Build strong underlying foundations and develop the structural processes needed to put circular economy strategic plans into practice. We know of one company that hoped to achieve its goals by developing a strategy and then moving straight to train its research and development team on the precepts of greener chemistry. But they did not formally embed sustainability into the stage gate process for new product development or set goals for product improvements. The result? Two years later, the program was essentially stalled.
- ✓ Tools and protocols must balance rigor and flexibility. Disruptive innovation may not fit neatly into the tools and guidelines developed for incorporating sustainability into product development. This means that tools and protocols cannot be too rigid, and teams cannot assume that if they simply check the boxes in the company's program that they will produce the most meaningful results.
- ✓ Implementation teams need support. This includes clear, simple, and readily accessible materials. It is unrealistic to expect, for example, that experts in product development will know what 'Use less toxic chemicals' means in practical terms. Companies with successful programs carefully consider what tools and guidelines design teams need in order

to understand what good looks like, and they refresh guidance, training, and tools on a regular basis.

- ✓ Top-performing companies provide resources for execution including: allocated staff time; internal or external consulting services to provide research or perspective; and a sense of community – and perhaps even friendly competition – among practitioners.

3. Measure and celebrate progress to reinforce culture change

- ✓ Collect data during product development in order to support ‘greener’ claims. Some countries impose regulatory requirements on companies who tout the environmental sustainability of their products. In the U.S, for example, the Federal Trade Commission has issued Green Guides.⁷² Collecting data to support claims with such guides can preempt charges of greenwashing.
- ✓ Successful companies plan to communicate and celebrate accomplishments. Progress against KPIs provides incentive to keep going; recognizing top performers keeps them motivated; and external communications position the brand with key stakeholders.
- ✓ Ensure you have solid internal and external communications plans. The case for change needs to be made with employees to engage them and to allow them to buy-in to changes that they will be crucial to implementing. Communication with external stakeholders is also critical to building trust and ensuring internal and external alignment in messages being conveyed.

The time available to act is short. Climate change is wreaking increasingly widespread damage, while the availability of raw materials dwindles, making current linear models economically and environmentally unsustainable. But society is beginning to embrace change. Emerging regulations in some parts of the world, consumer interest, and shareholder concerns give businesses incentive to develop and execute circular economy strategies.

As this briefing shows, many of the barriers to circularity are falling as enabling factors and precedents grow. An effective circular economy strategy begins with careful consideration of strategic objectives and advances through practical, data-driven attention to methodology. Effective programs connect cross-functional teams and embed circularity deep within routine processes, allowing for process change and improvements over time. Early adopters have shown that change to more circular products and operations is not only imperative but possible.



Early adopters have shown that change to more circular products and operations is not only imperative but possible.

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The purpose of the Institute is to define, accelerate, and scale sustainability performance by developing actionable insight for business. We provide an independent and authoritative voice to decode complexities. The Institute identifies innovative solutions to global sustainability challenges built on ERM's experience, expertise, and commitment to transformational change.

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