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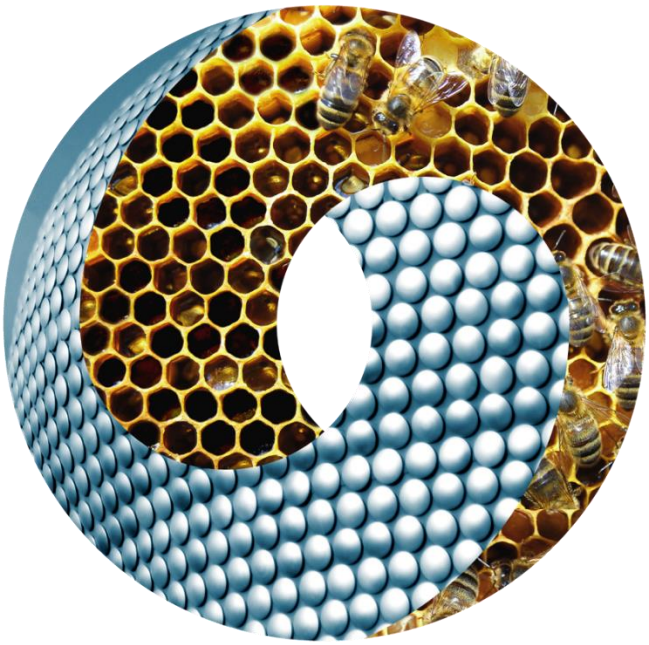
LECTURE N°13
2025 Series



Deloitte Climate & Sustainability Competency Lab

From science to business: providing companies with the knowledge to turn sustainability into action

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LECTURE N°13 | Circular economy transformation in organizations

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Interview with **Teresa Domenech** by **David Rakowski**

Teresa Domenech is an Associate Professor at the University College of London (UCL) and founder Director of the UCL Circular Economy Lab and the UCL Plastic Innovation Hub. She has contributed to leading international research in the areas of sustainable industrial development, decarbonization pathways and circular economy.

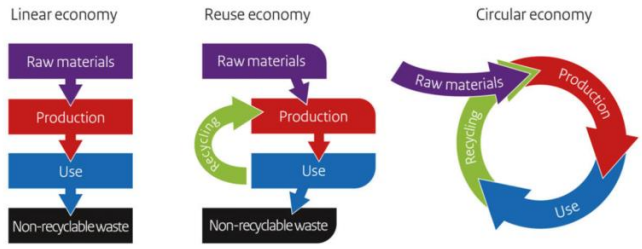
David Rakowski is partner at Deloitte UK and global leader for Circularity. He began his career in sustainability over 10 years ago and has led transformational projects across multiple sectors. As a systems engineer by trade, he brings together product, business, supply chain and digital design to develop sustainable solutions.

Q.1

What is circular economy?

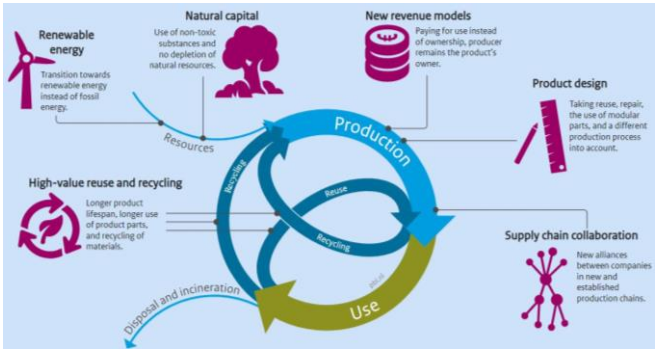
The **ISO Technical Committee** for Circular Economy, when developing the new family of **ISO standards**, recognized the need for a single, internationally agreed definition, which was established in the new **ISO 5904** (2024): an "**economic system** that uses a systematic approach to maintain a **circular flow of resources**, by **recovering**, **retaining** or **adding** to their value, while contributing to **sustainable development**." This means resources are managed in terms of both stocks and flows, the inflow of virgin resources is minimized, and the circular flow of resources is kept as closed as possible to reduce waste, losses, and emissions from the economic system.
The predominant model so far has been **linear economy** (Figure 1), that relies on extracting materials from natural systems, manufacturing products, using them for a (increasingly **short**) period, and then generating waste. This model has been contributing to many global issues, including **climate change**, **biodiversity loss**, and **water and air pollution**. Consequently, there have been efforts to move away from extractive models towards **alternative** value creation methods. An example is the **reuse economy**, that while being beneficial, still produces significant waste, emissions, and leakage. Conversely, CE aims to reproduce **natural processes**, generating output from minimal inputs.
We should strive to create systems that use a small initial intake of raw materials in production processes and recycle them, thereby minimizing leakages, emissions, and waste, and maximizing an efficient resource use.

Figure 1 – What is circular economy?



Source: UCL School of Management – Executive Education

Figure 2 – Key elements of a circular economy



Source: Het Groene Brein

C-TAKEAWAYS

Fast facts for the C-level

- CE aims to reproduce natural processes, generating output from minimal inputs and shifting the system to renewable energy
- CE is pivotal to achieve decarbonization targets, as forecasts say that meeting the demand of resources won't be possible without CE strategies
- The main challenges to implementing CE practices are: initial costs and investment, complex supply chains, technology gaps, regulatory and policy barriers, product design limitations, and measuring KPIs
- Among the greatest opportunities of integrating CE practices: cost savings and efficiency, new revenue streams, regulatory compliance and risk reduction, consumer demand, and talent attraction and retention
- Researchers have identified some frameworks to help organizations advance circularity practices, each prioritizing a different set of interventions
- CE interventions are increasingly seen as value-creating and risk-mitigating by financial institutions
- Circularity is a powerful tool to address regulatory shifts, as many policies are designed to promote circular behavior

Q.2

What are the core elements of circular economy?

In **ISO 59004**, we define **six core principles of CE**, which are complementary and interlinked:

- **System thinking**: adoption of a long-term approach
- **Value creation**: efficient use of resources to fulfil the core functions of organizations and society
- **Value sharing**: collaboration along the value chain or value network
- **Resource stewardship**: by closing and slowing resource flows
- **Resource traceability**: being accountable for sharing information with interested parties, addressing the complexity of global value chains
- **Ecosystem resilience**: contributing to regenerate ecosystems.

Additionally, there are **three core elements** to be emphasized when discussing about CE (Figure 2). The first is the need to keep material cycles **as closed as possible**, minimizing losses, waste, and emissions associated with resource use. Secondly, there is the shift to **renewable energy**. The third core element is **preserving natural capital** and the services provided by natural systems, including resource provision and the sink function of nature. This means that, as a company, we need to consider several aspects such as: shifting towards renewable energy; the type of natural capital we use and contribute to preserve; **new revenue models to maintain resource value**; actions during the product design phase that enable these new revenue models; and how we can trace and collaborate along supply chains.

Q.3

Why is it important to adopt a circular approach at a corporate and social level?

Provisioning systems refer to the ecological, technological, institutional, and social elements that interact to transform natural resources in order to meet human needs. The idea is to ensure **societal well-being** in line with the Sustainable Development Goals. To achieve this, our provisioning systems must operate efficiently, and resource extraction must align with **circularity principles**. In recent decades, **global resource extraction** has continued to rise, despite efforts to improve resource efficiency (Figure 3). This growth is largely driven by infrastructure development, linked in turn to population growth and economic expansion. But the unsustainable pace of resource consumption has become a key concern for policymakers. Globally, a significant portion of extracted materials is **for energy uses**. Fossil fuels, still the dominant energy source in many regions, consume large amounts of resources. Also, other materials are locked into socio-economic stocks like buildings, machinery, vehicles, and infrastructure. Over time, much of these resources end up as solid waste or emissions. The proportion of materials recovered and reintegrated into the production cycle **remains minimal compared to total resource use**.

At the corporate level, it is increasingly important to adopt **circular economy strategies**, as there is a lot of pressure to decarbonize. Decarbonization has been a clear commitment for many organizations worldwide, and especially in Europe they face ambitious targets across multiple sectors. However, research shows that **decarbonization pathways** require **vast amounts of resources**, which reflects on the price of some materials required for technologies of decarbonization. Forecasts of material needs for decarbonization suggest that meeting the demand of resources will not be possible without also implementing CE practices. In short, without circular strategies, we cannot guarantee the achievement of decarbonization targets. Ongoing research highlights how CE models can reduce reliance on virgin raw materials essential for decarbonization.

Additional reasons for organizations to integrate circular economy practices include: **cost savings and efficiency** (reports estimated up to **$630 billion** in net material savings annually in the EU manufacturing sector **by 2030**; circular approaches can also deliver **60–90% energy savings** when producing goods from recycled rather than virgin materials); **new revenue streams** (for example, 13% of Philips' 2019 revenue came from circular products and services); **regulatory compliance** and **risk reduction** (CE supports compliance with key EU initiatives like the Circular Economy Action Plan and the Critical Raw Materials Act); **consumer demand** (globally, **66%** of consumers say they are willing to pay more for sustainable brands); and **talent attraction and retention** (environmentally responsible companies tend to perform better in attracting and retaining talent).

"Forecasts of **material needs** for **decarbonization** suggest that meeting the **demand of resources** will **not** be possible without also implementing **CE practices**."

Q.4

How does the implementation of circular economy impact companies?

Implementing circular economy is a **complex challenge** for an organization, as it requires transforming all aspects of products life cycle—from supply chain management and procurement to operational processes.

The first step is to assess whether raw materials are sourced **ethically and sustainably**, and whether recycled or renewable inputs can **replace virgin materials**.

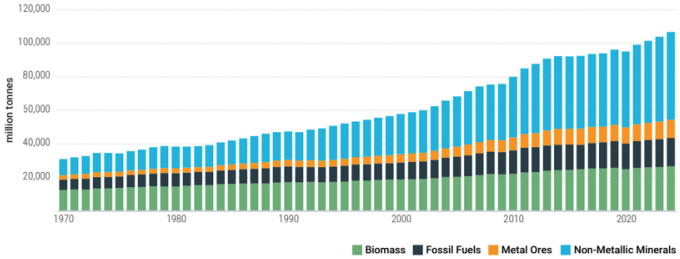
In the Manufacturing Phase, companies should ask: "Can we **increase energy efficiency** and **minimize waste** during processes? Can we adopt **cleaner technologies**?"

The Use Phase presents the greatest challenge for companies to monitor. Typically, businesses manage the supply chain **up to manufacturing**, while the Use Phase often falls **outside** their direct control—meaning the responsibility is passed **to the user**. This is true also for other phases of the general circular product life cycle, such as Product Disposal/ End-of-Use, Product Treatment/ Resource Recovery and Reverse Logistics. So, the key concept is that what has traditionally been **outside** the scope of conventional business models must now become **integrated** into companies if they want to **fully implement** a circular approach.

For example, among other things, they need to ensure that **consumers know how to use products responsibly**; they have to monitor for predictive maintenance, encourage the return of products, repair, refurbish, and remanufacture. They should also assess whether they can **collect used products** and reintroduce them **into their system** or reuse packaging and components. All these considerations materialize in the Product Design phase. **Designing** while taking into account all the aspects that cover the whole life cycle of products is going to be critical to articulate business models based on circular economy.

"What has traditionally been **outside** the scope of **conventional business models** must now become **integrated** into companies if they want to **fully implement** a **circular approach**."

Figure 3 – Global material extraction continues growing



Source: Global Material Flows Database (UNEP 2023a)

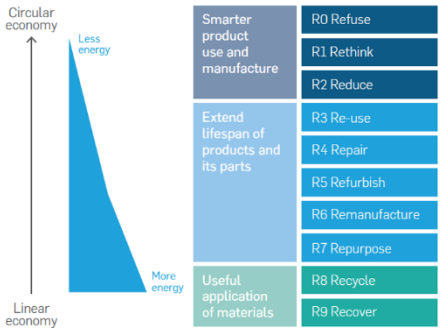
Q.5

How can organizations transform the way they work to create value?

There are several **frameworks** that organizations can adopt to advance CE practices. One example is the "**9 Rs Framework**," which prioritizes a range of interventions to accelerate circularity (Figure 4). A second group of strategies, slightly less virtuous but still in the direction of circularity, focuses on **extending the lifespan of products and their components**. This includes actions such as reusing, repairing, refurbishing, remanufacturing, and repurposing. The least preferred options are recycling and energy recovery through incineration of non-recyclable materials. Another relevant approach is the "**Slow, Narrow, Close, and Regenerate**" framework, which uses a slightly different narrative. It suggests that we should first **slow resource flows**, keeping materials in use at high value for as long as possible. This reduces the demand for virgin resources and encourages using fewer resources to deliver the same function or service. This leads to the concept of the functional unit: from a circular perspective, it's essential to understand how to fulfill a function **with the least environmental impact**. The framework also includes the "close" phase, which focuses on **maintaining materials in closed loops**, and the "regenerate" phase, which encourages for example to power the use of products **with renewable energy**. Organizations can transition their current models to fully embed circularity also by considering actions outlined in **ISO 59004**, which offers guidance for resource management across the value chain to improve circularity performance. These actions include: **creating added value** (for example through circular design and process optimization); **retaining and recovering value** (through strategies like reducing, sharing to intensify use, recycling, and waste management); **regenerating ecosystems** (thanks to the removal of harmful substances, mitigation and adaptation).

To give some examples of CE business models, we can mention **Patagonia**, which promotes repair, resale, and durable design to increase product lifespan (Extending Use & Lifespan model). **Unilever** applies the Using Fewer Resources model by reformulating products such as concentrated detergents, which require less material and water. **Danone** adopts the Restoring Natural Systems model through regenerative agriculture programs with dairy farmers, aimed at improving soil health and biodiversity.

Figure 4 – The 9 Rs Framework



Source: Potting et al., 2017

Q.6

What are the main challenges for CE implementation in organizations?

There are **numerous challenges** to implementing circular economy practices. Among the most significant ones, there are the **initial costs and investment**. These are sometimes downplayed or not made sufficiently tangible, as there is a tendency to present the circular economy as a very beneficial approach. However, it's essential to acknowledge that it often involves **high upfront investments** — particularly in redesigning products, processes, and supply chains — as well as **costly research and development** of new sustainable materials and technologies. It is therefore crucial to help companies and organizations understand that these factors must be considered in their decision-making processes.

Another key challenge lies in the **complexity of supply chains**. Tracking materials and ensuring circular practices across all tiers is inherently difficult. While this remains a challenge for many organizations, progress is being made. Companies are now increasingly required to report on **Scope 3 emissions**, and they are starting to gain a more **comprehensive view of their supply chains**. For example, having visibility of Tier 4 and Tier 5 suppliers is becoming more important to ensure resource traceability and to enable circular economy initiatives.

Technology gaps also present a barrier, including limited access to solutions that enable product take-back, refurbishment, or remanufacturing, and the lack of infrastructure for recycling and material recovery.

Regulatory and policy-related barriers may include the lack of supportive regulations or incentives, as well as complex compliance issues across different countries or regions. Often, national regulations differ in their expectations for circular design and waste management, making the implementation of circular strategies difficult from a bureaucratic point of view.

Additional issues include **product design limitations** — since products designed for durability, repairability, or recyclability are still relatively uncommon — as well as challenges related to **market demand and consumer behavior**. Indeed, many customers continue to favor new products over reused or refurbished alternatives.

Finally, the **lack of harmonized metrics** and KPIs is a challenge for CE implementation. To address this, the ISO Technical Committee on Circular Economy has been actively working to define **new international standards**. In collaboration with the **World Business Council for Sustainable Development**, we are also developing a global circularity protocol aimed at providing harmonized frameworks for measuring circularity within organizations.

Q.7

Why should organizations address circularity together with decarbonization?

David: Circularity was only briefly mentioned as a key theme at COP29, but there's growing consensus that it will be a **major topic** at the **next COP** in Brazil, as it is one of the most powerful tools and levers available for decarbonization. What do you think?

Teresa: As mentioned earlier there's increasing recognition that CE is essential to meet **decarbonization targets**. This is often referred to as the **twin transition**: we cannot transition to a decarbonized economy without also transitioning to a circular one. As resource constraints become more pressing, and the demand for resources to support decarbonization efforts continues to rise, it's clear that we cannot move forward without integrating circular principles. What's also important to highlight is that decarbonization is often viewed only through the lens of energy systems and energy supply. But that's just a part of the picture. Reports show that roughly **50-60% of GHG emissions** are associated to **the way we use resources** rather than to energy provision. These have long been blind spots in the climate conversation, but that's now changing. We are realizing that **transforming how we manage** resources is critical to achieve **decarbonization goals**. We must account for *all* emissions related to resource use and transformation—emissions that are often overlooked in more traditional decarbonization pathways. That's why we need a **twin transition towards decarbonization and circularity** as these two aspects could be reinforcing themselves in a positive way.

David: I really like the term twin transition—it captures the concept very clearly. On a related note, I'm hearing from **financial institutions** that there's now growing interest in adopting **more circular models** and they are thus wondering how to identify **business opportunities**, **measure** them, and assess the **associated risks**. What's your take on this?

Teresa: **Investors** play a pivotal role in driving the adoption of circular models. Some financial institutions have already started incorporating circular economy criteria into their **investment approval processes**. They're increasingly focused on circularity because it's tied to **resilience**. Resilient circular strategies can help reduce exposure to risks like price volatility and supply chains bottlenecks, especially in the face of global uncertainties. This means circular economy interventions are now seen as **value-creating** and **risk-mitigating**. In the coming years, we're expecting an increasing pressure from investors to consider circularity and supply security, which will further shape how finance approaches sustainability.

Q.8

What can we expect in the context of policy and regulations related to CE?

David: Looking at some of the projects we're working on with clients, we're seeing that some organizations view new regulations as **opportunities**, while others are taking a step back to **reassess their strategies** in response to them. Unsurprisingly, circularity is proving to be a **powerful tool** in addressing these regulatory shifts—especially since many of these policies are specifically designed **to promote circular behavior**. One regulation that's gaining significant attention right now is the Carbon Border Adjustment Mechanism (CBAM). It has the potential to strengthen the business case for circularity within organizations. What are your thoughts on this? Are there any other upcoming regulations you see as particularly transformative for the circular economy?

Teresa: Regulation can indeed make a tremendous difference. **CBAM** is a strong policy instrument aimed at encouraging companies across multiple sectors to adopt more sustainable practices, and it is clearly aligned with resource efficiency and circular economy principles. And we expect even more **circular economy requirements** to be introduced in the near future. We're already seeing this in the new **Ecodesign for Sustainable Products Regulation** (2024), which includes specific requirements related to the use of resources. We will also see the scope and the level of ambition of the forthcoming **EU Circular Economy Act** (expected at the end of 2026). At the moment, there have been some efforts: we can see for example the new proposed **End-of-Life Vehicles Directive** (2023), that introduced a number of requirements around recycled content in vehicles. These types of bold **regulatory moves** are essential to accelerate the development of secondary material markets, and we are going to see even more requirements in terms of **resource efficiency**, which will materialize in some ambitious circular economy policies across sectors. I welcome these steps from the EU and am also interested to see how similar policies will evolve in the UK.

David: Absolutely. Gaining better control and management of our resources is now a **strategic imperative**. As a result, we'll continue to see **policymakers** introduce **measures** that create the right conditions for circular business models to thrive. The future of the economy will increasingly depend on **how effectively we embed circularity** at its core.

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