



COMMERZBANK

**White Paper**

# How API based Ecosystems can serve Circular Economy

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An aerial photograph of a lush green forest. In the center, a large, irregularly shaped body of blue water is arranged to form a recycling symbol (three chasing arrows). The water reflects the sky and surrounding trees. The forest is dense and vibrant green, with some white clouds or mist visible in the upper left and right corners. A small yellow airplane is visible in the bottom left corner.

## Chapter 1

# From net zero to circular economy

**“ The increasing challenge on how to conserve the planet’s environment raises utmost attention for sustainability in almost every industry. The call for enhanced environmental behavior will certainly reinforce changes in our daily life that are yet already present. Ultimately, the resulting changes will lead to one of the largest transformations since the emergence of Industry 4.0. ”**



**Bettina Storck**

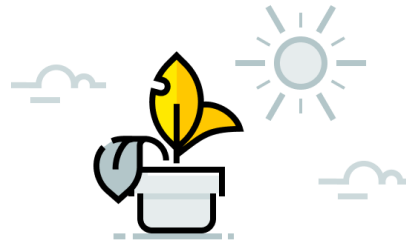
Head of Group Sustainability Management

But why is sustainability important at all? The idea of sustainability was established centuries ago, with a focus on environmental issues, and extended with an economic and social focus, known as sustainable development goals [1]. In today’s world, we are faced with a plethora of challenges, such as increasing (over-)population, resource depletion, poverty, or political instability, which are strongly interconnected [1]. To preserve our (habitable) planet for future generations, it is vital to deal with the challenges mentioned [2], since our world is at risk due to the increasing negative impacts on social, economic, and ecological factors [3].

Steadily increasing consumption poses a challenge to the conservation of our planet and highlights the urgent need to rethink the currently prevailing “take-make-use-dispose” principle of our linearly organized economy [4]. In addition, social and economic challenges are on the rise, such as global inequalities, high unemployment, unfavorable working conditions, and financial instability [5].



The global consumption of materials (such as fossil fuels) is expected to double in the next 40 years [9].



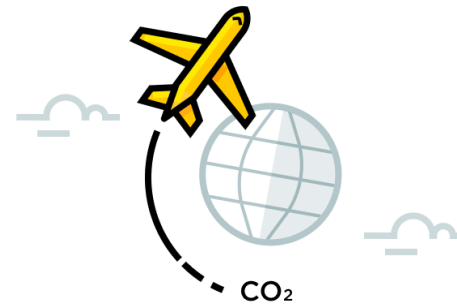
The worldwide resource extraction has tripled over the last 50 years and is still accelerating [8].



The worldwide waste generation will drastically outpace population growth by more than double by 2050 [7].



Earth takes almost one and a half years to regenerate what we use in a year [6].



Global CO<sub>2</sub> emissions doubled from 1975 until 2021 [10].

Figure 1: Sustainability Facts

# The nature of sustainability

Although governments, policymakers, and corporations already address these challenges, it is evident that current sustainable interventions, such as net-zero initiatives, are necessary but not sufficient enough to fulfill the ambitious climate goals or to solve the existing and upcoming resource conflicts [13]. Net-zero initiatives might, in the last consequence, imply to abandon all consumption [13]. This might then culminate in the fact that a large share of business models cannot sustain since growth is the enemy of net-zero [13].

The concept of the circular economy decouples growth from the consumption of resources and associated environmental challenges [14]. This imposes a turn on the future implementation of sustainable strategies for a greater purpose [14]. Fortunately, the concept moves increasingly into the consciousness of political decision-makers [15].



*Sustainability describes the idea of continuously preserving the world in ecological, economic and social terms [1]. Concerning the business level, corporate sustainability defines the goal of positively managing ecological, social, and economic impacts [11] to reduce the company's negative impact on the environment. ESG specifies principles that incorporate, besides environmental and social aspects, also governance guidelines, which companies can integrate within their business activities [12].*

# The Circular Economy

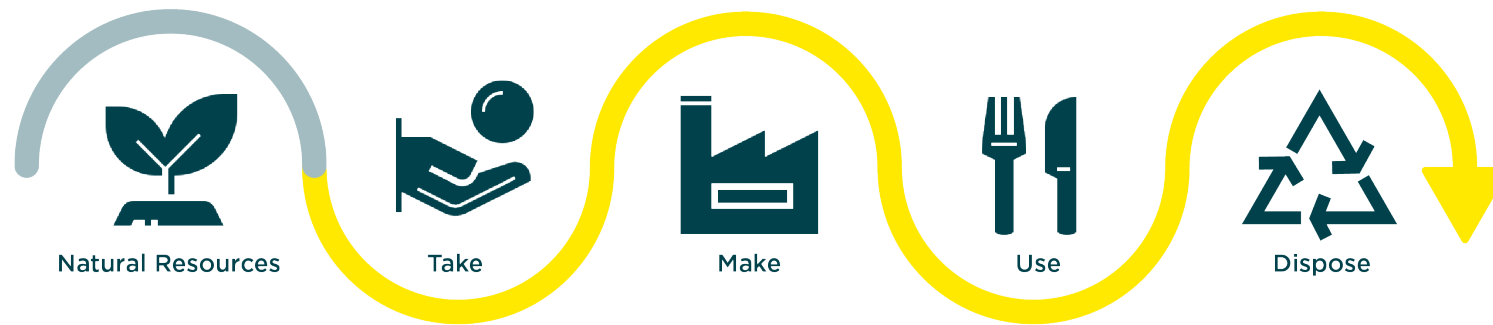


Figure 1: Linear Economy | Source: following [www.datadriveninvestor.com](http://www.datadriveninvestor.com)

In a circular economy, all goods that would usually be discarded by their end of use would create the basis for new products, eventually leading to waste reductions [17] and representing an alternative to the familiar linear economy's "take-make-use-dispose" approach (Figure 1) [19].

The regenerative system of the circular economy is best represented by the circular flow of biological and technical materials [19]. Figure 2 illustrates this circular flow. Residuals within the biosphere serve as the basis for further production through regeneration by industri-

al processes or the natural environment [19]. The intention for the technosphere is to either up- or recycle, share, or extend the lifetime of the commodity to prevent it from fading out of circulation [19]. Although both circles illustrate the function of a circular economy in a slightly different way, in principle, they can be considered in a complementary way. While within the biosphere materials are recycled ecologically, so that the product no longer exists after usage, products of the technosphere are usable for other purposes at the end of their service life [19].

However, resources from the biosphere may be leveraged for the production process in the technosphere due to full integration. A great example for the biosphere applies "Mechanical biological treatment" to organic household waste which outcome could be used to enrich soil [20]. Recyclable headphones, which are distributed as a service, dismantled after usage, and finally fed back into the production process [21], are an example of the technosphere.

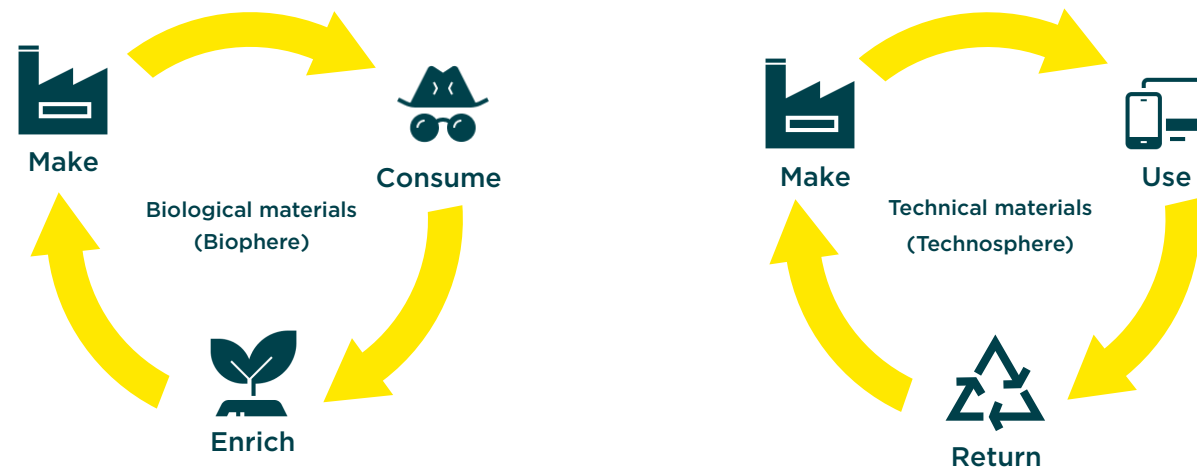


Figure 2: Circular Economy System Diagram | Source: following [www.datadriveninvestor.com](http://www.datadriveninvestor.com)

The shift from a linear economy to a circular economy should ideally lead to the reduction and reuse of waste and resources, indicating the possibility to solve economic, social, and environmental challenges [19]. Studies that have evaluated the downstream effects of a circular economy have found positive inferences. For Europe, it has been forecasted that resource productivity could grow by 3% annually, leading to total resource benefits of 0.6 trillion EUR by 2030 [22]. The entire system change to a circular economy in Europe could translate into a potential GDP increase of 7 percentage points by 2030. (due to non-/resource and externality benefits) [22].

To enable a circular economy, new business models are required to transform our linearly organized economy. This transformation could unleash additional resource productivity gains and innovations, which could lead to an increase in employment and growth [22]. However, these positive implications also pose challenges that are to be considered by policymakers, governments, and participants of a circular economy. Besides the challenges, we see several accelerators that could be helpful to boost a circular economy.



*A circular economy is a regenerative system that intends to use and reuse resources and materials multiple times in a closed circle [16] while pursuing the long-term goal to close resource loops and minimize the consumption of resources [17]. The overall concept of the circular economy considers not only sustainable factors (e.g., how to minimize resource need) itself but also economic aspects, such as how to integrate new business models, and how to decouple growth from environmental issues [14]. Furthermore, the concept initiates a shift in the mindset from minimizing negative to maximizing positive environmental impact [18].*





**Chapter 2**

# Challenges and accelerators of circular economy business models

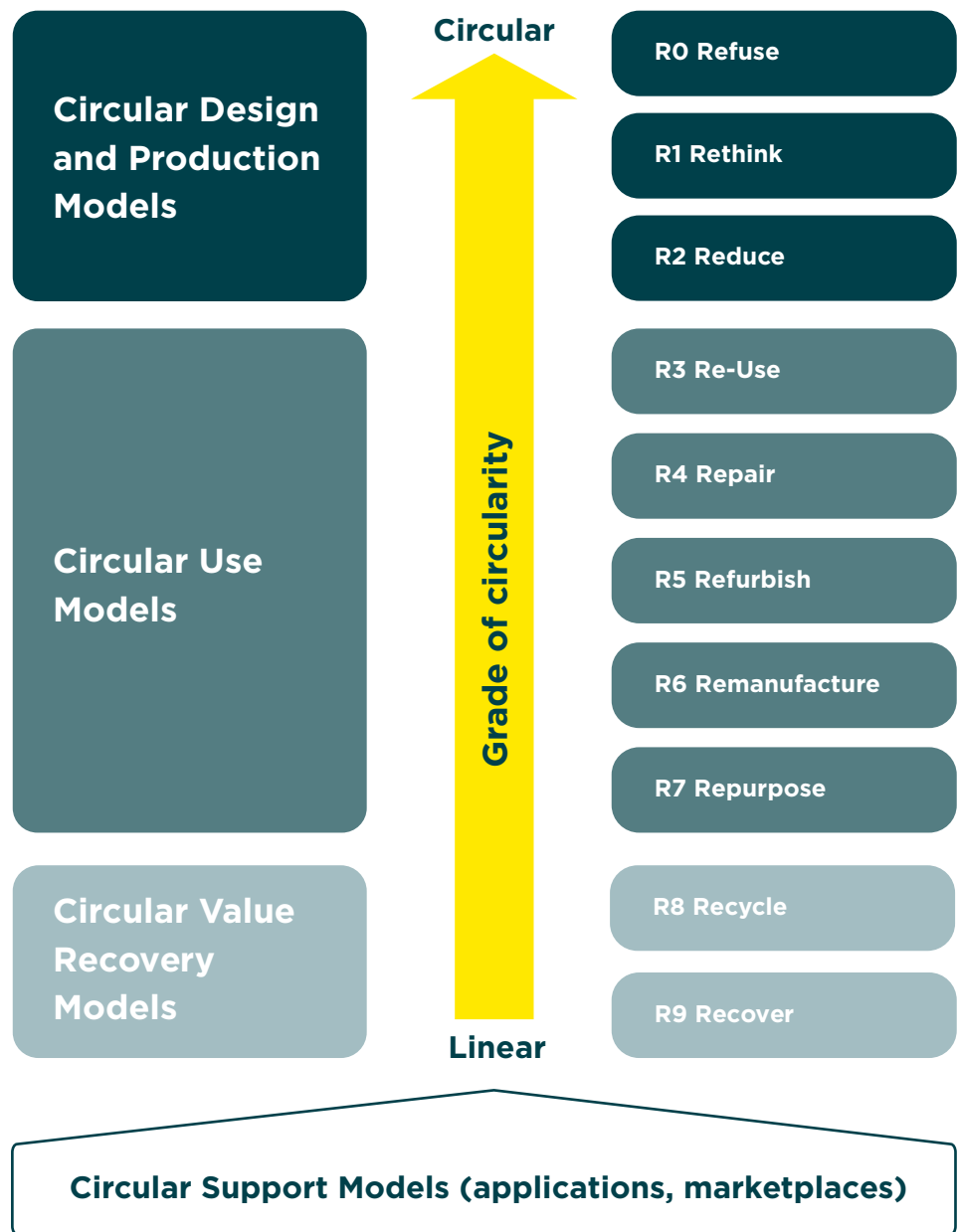


Figure 3: R-Framework | Source: following Potting et. Al. (2017)



The first class of models can be described as **Circular Value Recovery Models**. In this model, it is essential to recirculate used resources and consequently turn waste into input material (e.g., the reuse of wastewater) [26]. The company “Cirplus” is a prime example that contributes to the circular economy by offering a marketplace for recycled synthetic materials utilizing digital capabilities [27].

The second class is best described as **Circular Use Models**, focusing on the production and the improvement of material and resource efficiencies, such as the usage of sustainable material or increased durability, functionality, or modularity [26]. One example can be seen in “VYTAL”, which built a digital multi-cycle system enabling the reuse of “to go” food boxes that we at Commerzbank use in our canteen.

The third class, in which the strongest circularity is achieved, are **Circular Design and Production Models** which enable circular economy through special product design or new developments [26]. Researchers from RWTH Aachen University have exemplarily developed a method on how to reincorporate carbon dioxide as a resource into the production process of textile fibers while striving to close the carbon cycle [28].

Underlying all classes, experts, intermediaries, marketplaces, as well as software applications, serve as enablers of a circular economy, known as **Circular Support Models** [26].

As already mentioned, new business models are needed to initiate a transformation of our currently linearly organized economy towards a circular economy [23]. In general, the circular economy models can be arranged into three classes that span from stronger linearity to more circularity [24]. Complementary to the three stages of circularity, various key strategies have been established, also referred to as the “R-Framework”, that operationalize the concept of the circular economy [25].

Figure 3 illustrates the three circular economy classes and the R-Framework key strategies. Even though this representation is based on analyzing production chains, we are con-

vinced that the circular economy models presented will apply to the world of digital services as well.

Regarding the classification of circular economy models following the representation in Figure 3, new business models will arise in all the three classes. Nevertheless, we expect a difference between the business models dependent on the grade of circularity in respect of the underlying principle and the need for collaboration. First, business models connected to the classes of Circular Use and Circular Design and Production Models will show a stronger focus on the product-as-a-service concept. Following this concept, producers

stay the owner of a good and sell it as a service to their customers. Accordingly, the producer retains control of the recycling and re-use of the product through its whole lifecycle. This is a basic condition that is important to building higher grade circular models. Second, higher grade circular models demand a closer collaboration between the engaged participants. Closer collaboration is needed as higher-grade circular business models must consider the whole (and more complex) product cycle. In contrast, low-grade circular models are mainly associated with a lower degree of cooperation to realize a business model, such as the classical recycling of materials.

# Challenges

Several challenges need to be overcome for a successful transformation of the linear into a circular economy:



## Financing

Financing must be allocated to participants of a circular economy to embrace a transformation or an emergence of new circular economy-related business models. Further, the valuation of circular goods and their “circular value” at any stage in their useful life needs to be considered.



## Payment modalities

Payment modalities need to be elaborated, as various business models arising from the circular economy are increasingly geared towards the provision of services instead of the usual single payment.



## Business models

Corporations need to work together in a circular economy to develop and drive new business models. This is only possible in a collaborative environment with defined rules and responsibilities. As these business models relate to circular goods, it is essential to be able to transparently track the entire product cycle (e.g., from production to recycling) and the involvement of all stakeholders. In this context, supply chains need to be trustworthy and traceable to determine the origin of goods and resources and to track the entire production process. Further, data can no longer merely serve a single corporation; it must be shared among different stakeholders of a collaborative environment to enable required tracking and tracing in the supply chain.

# Accelerators

We see the potential for different accelerators that could speed up the transformation process from a linear economy to a circular economy:



## Regulatory pressure

Regulatory pressure imposed by policymakers. The Supply Chain Act poses further regulatory restrictions on corporations to improve the protection of human rights in global supply chains [29]. In addition, the ESG rating provides information on the implementation of environmental, social, and governance factors within a company and its emission of sustainable investments [30]. This leads to transparency for private and institutional investors in ESG investments.



## Standardized platforms

Standardized platforms for the collection and distribution of data could enable circular economies and their participants to accelerate their business model and cooperation in an ecosystem.



## Customers

Customers are increasingly changing their buying behavior towards more sustainable products [31] which accelerates the emergence of and investments in more sustainable business models. Further, sustainable investments by customers (e.g., sustainable finance products) are on the rise.

A woman with long, curly hair and glasses is sitting at a desk in a dimly lit room, looking at a large computer monitor. The monitor displays code in a dark-themed editor. A desk lamp is lit, casting a warm glow on the desk. There is a small potted plant on the desk. The overall atmosphere is focused and professional.

## Chapter 3

# How technology can support the transformation from a linear to a circular economy

The challenges regarding the transformation from a linear to a circular economy cannot be solved by any single party. Hence, the challenges trigger interplay between different actors which ultimately leads to the dynamic evolution of ecosystems. New business models that support the movement from a product focus to service focus are supported by such interconnected settings. The new service focus will lead to increased economic interdependencies, necessary cooperation between different actors, and transformed financial flows. Hence, the need for the exchange of information between multiple stakeholders becomes increasingly relevant. APIs can enable cross-company communication between their IT-systems [32]. APIs further promote sustainable business models as they are reusable by different actors, utilizing a standardized way of connectivity. Thus, they support the fundamental idea of a circular economy which promotes the efficient use of resources. This further enables easier connectivity between various actors through APIs while promoting the emergence of interconnected business models utilizing ecosystems. Each company

can provide their core competencies in such API based ecosystems which will lead, in connection with service-based business models, to a closer connection of customers. Therefore, the closer connection of customers allows providers to offer integrated services throughout the whole customer journey excavating the idea of API based ecosystems.

In conclusion, we argue that ecosystems based on APIs are going to be integral in the transformation from traditional economy models into new business models, as they are founded through collaboration. They will not only allow for sustainable services but also reusing and sharing already established competencies and services between participants – as in a circular economy business model.



### APIs

*In light of the increasingly connected world, APIs offer the possibility to meet the needs of business and corporate clients, as they enquire customized solutions, end-to-end automated services, and hybrid-digital-personal relationships [32]. APIs enable communication between different software applications without deep knowledge of the participating system [32], which results in high flexibility and greater functionalities [32]. APIs are one of the software-based enablers of collaboration. Thus, value co-creation between different participants, aiming at increasing customer value, is accelerated [32].*

A photograph of a city skyline at sunset. The sky is a mix of orange, yellow, and light blue. In the foreground, there are green trees and residential buildings. The middle ground is filled with various skyscrapers and modern buildings. In the background, there are rolling hills or mountains under a hazy sky. The overall mood is serene and urban.

## Chapter 4

# What does that mean for banks?



**“ Banks stand for trust and security in direction of customers, corporates, and regulators. Banks combine deep experience in financial business with their know-how in executing regulatory rules. All this brings significant potential to renew old roles or to establish new roles for banks in the circular economy. ”**



Sabine Schoon-Renné  
Head of Corporate Client Strategy

We will see a transformation of the traditional perspective and an emergence of a non-traditional perspective on banking. Therefore, banking must expand from the traditional areas of banking to support clients in dealing with challenges and accelerators arising in a circular economy.

## Traditional perspective

From a traditional perspective, banks could help to solve some of the remaining challenges in establishing new business models to enable a circular economy that cannot be tackled by technology. In providing sufficient monetary resources, they could help to overcome the lack of financing. Impact investing must target these business models with appropriate instruments (e.g., more attractive financing conditions). Potentially affecting financing, banks could help in the valuation of circular goods. These circular goods are supposed to be produced with the aim of preserving their life or reusing the resources used, which consequently affects the circular value at any stage of their useful life.

In addition, banks should reconsider traditional payment modalities to enable new business models. These new business models will increasingly include the provision of services that require, for example, multiple payments within the product life.

## Non-traditional perspective

From a non-traditional perspective, banks could leverage their economic position and technical expertise. Banks could provide technical solutions and technical advisory services to enable their clients to transform or create far more sustainable business models within a circular economy. Furthermore, the offering of technical solutions, such as APIs, followed by technical advisory services, could enable participants of a circular economy in realizing innovative business models and even ecosystems by greater interconnection. To establish a connection between different actors, banks can also leverage their trusted position in society. Due to their technical expertise and ex-

perience in handling sensitive data, banks can also assist in data management (e.g., data collection, processing, storage, distribution) and can eventually offer data platforms. These platforms could additionally accelerate collaborative environments in circular economy related business models.

Moreover, banks could also use their expertise for advisory services concerning imposed regulatory requirements which need to be fulfilled by companies. Banks are familiar with sustainability regulations as they are already involved with ESG ratings concerning financial investments.

Ultimately, banks will attain a key role in this new transformation towards a circular economy due to their high financial experience, strong relations to customers, corporates, and regulators, as well as their trusted positioning in society. To comply with this transformation, banks need to think one step ahead to be ready to provide innovative and integrated advisory services, as well as the openness to cooperate.



## Chapter 5

# Our position with regard to sustainability and circular economy

As one of the first signatories of the “Principles for Responsible Banking” in 2019, Commerzbank underlined its commitment to support the transformation of its clients with advisory services and sustainable financial products. In addition, Commerzbank has joined the Net-Zero Banking Alliance in April 2021 with 15 other German financial institutions to further promote and foster climate protection. With sustainability becoming increasingly urgent, Commerzbank positioned its sustainability department in 2020 right under the Board of Managing Directors to ensure rigorous sustainable commitment and execution within the defined strategic targets. Further, we would like to highlight a few initiatives that have already been implemented.

To enable its clients in building new customer-facing solutions, Commerzbank established the “API-Banking” department in 2017. The API-Banking department offers standardized and reusable API solutions as a software-based enabler to promote collaborations among corporations. These collaborations would ideally

focus on building up ecosystems. In the future, these ecosystems would entail sustainable business models which could also drive the concept of the circular economy. Along with our expertise in (regulatory) advisory services, we are sure that we can provide a holistic service to enable our corporate clients for the challenges and accelerators that arise within a circular economy.

Furthermore, we already promote innovative business models in line with the circular economy. The company Fairown, in which Commerzbank has invested through its early-stage investor “main incubator”, helps to scale business models in a circular economy without the exploitation of resources that would usually take place [33].

For its private clients, Commerzbank provides a carbon dioxide footprint calculator which entails tips on how to reduce individual carbon emissions [34]. Further, it can guide our clients concerning sustainable and circular investments.

We as Commerzbank see ourselves as an enabler by combining financial and regulatory expertise, as well as technical know-how, for more sustainable goals.

**“ We are convinced, that the challenges of today cannot be solved alone. We all need to collaborate to develop circular business models embracing the idea of true sustainability. With our clients and network, we are able to provide products and advisory services which enable us to support the transformation into more sustainable business models. Let’s start and connect! ”**



Christoph Berentzen  
Head of API & Open Banking

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