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Henning Wilts

THE CIRCULAR ECONOMY
KICK-STARTING THE TRANSFORMATION

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INTRODUCTION: THE CIRCULAR ECONOMY – KICK-STARTING THE TRANSFORMATION

In 2020, the European Commission's Circular Economy Action Plan and the German Federal Government's update of the German Resource Efficiency Programme (ProgRess) showed that they are willing to tackle the intensifying issue of wastage and over-consumption of natural resources. Next to decarbonisation, the process of moving away from the linear economic model – involving production, consumption, and disposal – is the second pillar of transformation from our existing model of value creation towards an sustainable way of doing business that respects the material limits of our planet.

In Germany, as with the rest of Europe, climate protection is already an established and publicly accepted policy goal. The German Federal Climate Change Act, the Climate Action Plan 2050 and the European Commission's Green Deal all testify to the fact that the goal of climate neutrality by the middle of the 21st century has been given a tangible political strategy with concrete intermediate steps and instruments that go beyond classic environmental policy. This reflects the criticality of a comprehensive transformation towards climate protection, insofar as binding targets are concerned.

By comparison, the transformation to a circular economy is still in its relative infancy. Despite gaining momentum over the last few years, there is currently still a lack of similarly ambitious political frameworks to anchor circular economic models in all political fields beyond environmental policy and the business of waste management.

The issues of circular economy and climate protection share strong parallels and mutual interdependencies: they both require political, structural, and economic transformations that must be balanced with socio-economic potentials and challenges. The circular economy can learn from climate protection and utilise synergies. The discourse surrounding both issues can be approached in unison to ensure that this transformation to sustainable economic practices is a successful one. It is also clear that successful decarbonisation of the economy can only be achieved through circular economy models.

The transformation of economies comes with enormous challenges. Over time, the linear economic model has created numerous path dependencies that will need to be overcome in order to allow circular solutions and products to become competitive. While a self-perpetuating system has developed and become very cost-efficient due to institutional lock-in effects that enable price dominance, this has come at the cost of the externalisation of enormous environmental and social costs that are borne by society today. This is where honesty requires a sober view of the high transaction costs that a transformation will entail. Bold and ambitious political governance is required to ensure the necessary transformation and with it, no less than the continuing existence of intact eco-systems that we depend upon.

Where do we now stand along this path? In 2020 and 2021, the Friedrich Ebert Foundation has posed this question within the framework of the discussion series called 'Zirkuläre Wertschöpfung' (Circular Value Creation). Over three events, the following aspects of a comprehensive transformation strategy were discussed under the headings of 'Challenges for industry, technology and innovation policy', 'Challenges for global value chains and international trade policy', and 'Cornerstones of an economic and fiscal policy framework.' The goal here was to take stock of the necessary political frameworks beyond the policy areas of environmental protection and waste management.

This publication is the result of the Circular Value Creation discussion series. It looks beyond political status quo to identify both the areas of activity as well as the political fields that are essential for a successful transformation. This paper identifies fields of activity for the integration of 'circular value creation' in innovation, industry and economic policy, among other areas. It is becoming increasingly clear that the linear form of economy is a dead-end that must be exited from as soon as possible. The transformation to a circular economy is not only necessary, it also brings enormous value creation and employment potential. Moving quickly to become a

first mover in global competition will be decisive in being able to compensate potential losses from those areas that used to be most profitable in linear economic models. The competitive ability of circular business models must be ensured through innovative forms of policy-making to successfully achieve this transformation. This requires a cross-sectoral and inter-departmental circular economic strategy with clear responsibilities, priorities and processes.

We would like to take this opportunity to not only thank all participants in this series, but of course most especially the speakers: Peter Börkey, Sandra Bränzel, Dr Christoph Epping, Professor Dr Heike Joebges, Professor Dr Helmut Maurer, Ulrich Reifenhäuser, Carolin Schenuit, Michael Thews and Professor Dr Rainer Walz. We would also like to extend special thanks to Henning Wilts, who participated in this discussion series, offered his advice and penned this study. We wish you an interesting and engaging read.

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IN BRIEF: FOUR THESES FOR THE CIRCULAR ECONOMY

It is now generally accepted that a circular flow of economic activity is more desirable than the linear economics of production, consumption and the creation of waste. Who would disagree with putting an end the over-use of our planet's resources?

Since it would be of little value to create yet another document on the fundamentals of the circular economy in the long catalogue of such publications, this paper will instead discuss the framework conditions for an actual transformation into the circular economy: How do we get to a circular economy, and as quickly as possible? Where are the discussions taking place about who would benefit and who would lose out in this process? What would the necessary cornerstones of a policy be that shapes these processes in such a way that the envisioned environmental, economic and social advantages could actually be achieved?

This publication, therefore, focuses on the following four theses:

Thesis 1: Linear throwaway society as a dead-end
The basic idea of a circular economy is neither new, nor is it particularly difficult to understand: resources should not be wasted when making or using products, and products should be used in a way that leaves as little waste as possible. It should be possible to optimally recover the resources contained in a product, and non-usable residues should return to natural cycles. For the longest period in the history of human development, this kind of economy was perfectly normal and indeed formed the basis of human survival (Krausmann et al. 2016).

In contrast, our current and predominantly linear throwaway society has been an invention of modern times and a relatively recent development. This has only been made possible by factors, such as multiple market failures involving the massive externalisation of environmental and social costs that have guaranteed cheap raw materials for many decades, globalisation that disaggregated value chains and policies that have allowed products to be put to market that are not recyclable or for which there is no recycling. The linear economy has been made possible by massive investments that are borne by society in the form of landfills, waste incineration plants, and attempts to avert environmental damage with aftercare.

This economic model is based on ever-increasing resource consumption and is very clearly reaching its limits. In 2019, for the first time, humanity used more than 100 billion tonnes of natural resources, and this amount is responsible for more than 50 per cent of global greenhouse gas emissions and more than 90 per cent of biodiversity loss (Oberle et al. 2019). It will, therefore, not be possible to live within planetary boundaries with a global population that will soon exceed 10 billion people without a transition to a circular economy. Even now, global resource consumption would require 1.75 Earths. Indeed, if the entire world were to live as resource-intensively as Germany, as many as three Earths would be needed (Global Footprint Network 2021).

Thesis 2: Something is being done, but far too slowly
Politicians have now understood that the linear throwaway society is a self-destructive dead-end. The European Commission has expressed its will to transform the economy with its Circular Economy Action Plan. The German Government has also underlined its willingness to do so with its German Resource Efficiency Programme (ProgRess), which has yet to be implemented (see Chapter 2).

This is where political debate has clearly underestimated the time factor. For more than a decade, the focus has centred around conceptual questions of the appropriate definition of the circular economy or the demarcation of circular value creation and circular economy. Although these questions are indeed important, because they are closely linked to competing interests and responsibilities, the question of how this transformation can be accelerated is far more important – not only for reasons of environmental policy, but because the circular economy represents an economic and industrial policy opportunity to maintain Germany's competitiveness as a business location and thus also hundreds of thousands of jobs.

Thesis 3: The circular economy makes economic sense, but there will be winners and losers
A successful circular economy brings very clear economic benefits. This is being proven by an ever-increasing number of studies, such as, for example, by the Ellen MacArthur Foundation, or the Circular Economy Initiative Germany (Weber/Stuchtey 2019), only to name two. Indeed, the European Commission expects the implementation of the Circular Economy Action Plan alone to increase value creation by 80 billion euros per year. It is, therefore, foreseeable that these socio-economic benefits will be best accrued by countries and regions that most rapidly push ahead with the transformation of their economies and thus optimally position themselves in the global competition for investment, jobs and the associated emerging industries. The transition to a circular economy will be disruptive. While it comes with opportunities, there is also the risk of losing old strengths, which will be seen very concretely in the decline of classically linear sectors of the economy. The circular economy is not a zero-sum game, but in global competition there will be winners and losers largely depending on who can secure the appropriate starting position as first mover or early follower.

Thesis 4: A successful circular economy requires innovative policymaking
As the linear economy has been so successful, it is difficult to overcome due to its ability to build on a self-contained and thus consistent regulatory system that has been repeatedly adapted and optimised over decades. This has resulted in massive path dependencies that even make the type of linear business models, generally considered outdated, still appear profitable. At the same time, it is still difficult to integrate innovative circular business models with regards to the kind of logic used in existing processes such as risk assessment and accounting procedures. How is it possible, in a legally secure way, to determine the residual value of a plant that can be repeatedly repaired via remanufacturing processes – reprocessing processes that put plants or products into an "almost new" condition? And what liability rules should apply to sharing models? Such questions can be answered and acted upon, but they can also cause massive transaction costs compared to the well-rehearsed models of the throwaway society.

This makes it very clear that the transition to a circular economy cannot be achieved by environmental policy alone. The circular economy is a classic interdisciplinary and cross-sectoral issue that should be anchored in tax law as well as in research and industrial policy. For example, climate policy has produced entirely new processes and institutional regulations. It is unfortunate that discourse in Germany largely addresses the circular economy and climate policy separately, despite the many thematic interfaces, possible learning and synergy effects (see Chapter 4 on key points of a circular economy strategy).

This means that innovative approaches are needed to firmly anchor the topic of the circular economy in other relevant policy fields. Not only must economic, industrial and research policy be benevolently flanked by the radical transformation of production and consumption structures, if this process is to be implemented with sufficient speed, the key challenge will be socio-political distribution issues and integrating these topics equitably, and with the necessary acceptance.

Aim and structure of this publication
In order to most productively make a contribution to further political discussion, these theses will provide the background for the following key questions to be addressed by this publication:

1. Where do we currently stand along the path to a circular economy, what has been done in the last few years, in what sense has Germany become more ‘circular’ and what areas most need to be addressed as well as what contribution has been made by the EU Green Deal and what gaps does it leave?

2. What would a comprehensive circular economic policy look like, which topics, aspects and political fields must it encompass and which leverage points and hurdles must be addressed?

3. What does this mean for concrete areas of application, how can the circular economy be integrated into innovation, industrial and financial policies and which preconditions and formats are required?

The chapters addressing the current status quo, instruments and cornerstones of an overall circular economy strategy are based on the informative inputs and debate that arose within the framework of the FES discussion series Circular Value Creation. The interpretation and conclusions drawn from this, of course, are the personal opinions of the author and in many places are explicitly formulated as hypotheses that need to be either refined, strengthened or rejected during the evolution of further discussions.

By 2030, it will have become clear whether the goals developed during long processes, such as the Sustainable Development Goals of the United Nations or the Paris Climate Accords,will actually be achieved. A decade of urgent implementation lies ahead, and the aim of this document is to contribute to this process.

1

WHERE DO WE STAND ON THE PATH TO THE CIRCULAR ECONOMY?

1.1 STATUS QUO OF THE CIRCULAR ECONOMY

Assessments of the circular economy often try to break down complex transformation processes into figures that are easy to communicate. In this manner, the Circularity Gab Report 2020, for example, came up with the clear statement that only 8.6 per cent of the world's economic activity is circular, meaning that only a fraction of raw materials used are actually reused (Circularity Gab Reporting Initiative 2020). There is an undeniable need for action, but where exactly? In order to answer this question, the following section will differentiate between the various objectives of the circular economy: waste avoidance, closed loop material cycles, and contributions to the conservation of resources as overarching objectives. The complexity of the circular economy is also a result of these goals contradicting each other. For example, while thinner packaging reduces the amount of waste, it also makes recycling more challenging. This means it is essential that different levels of instruments and goals are clearly differentiated. It is important to see that neither individual recycling quotas, nor the circular economy as a whole, are goals that are singularly justifiable in themselves. But, rather, they are seen as instruments for a transformative process to a climate-neutral and resource-conserving society.[1]

In 1996, Germany passed the Circular Economy and Waste Management Act (now called the Circular Economy Act [KrWG]) with the explicit goal of furthering the circular economy. Here, a so-called waste hierarchy is defined, according to what kind of waste is first and foremost to be avoided, with waste management planning to be oriented towards this goal. Only when this is not possible, should waste be reused, recycled or (in the last possible case) burnt. Putting waste in landfills without prior treatment has been practically prohibited in Germany since 2006 due to administrative regulations called Technical Instructions on Municipal Waste ("Technische Anleitung Siedlungsabfall"). In the 1980s and 1990s, Germany also saw the introduction of the extended manufacturer responsibility for packaging or "can deposit" and set the pace worldwide for a comprehensive waste policy focused on the goal of safe disposal. This stipulated that waste should not pose any direct risk to the environment and most especially not to the population. Here, regulations on pollutant loads from waste incineration plants, for example, have also been made significantly more restrictive. This means Germany is competitively well-positioned for the production of technologies required for these kinds of processes on the international stage and German plants are now exported to almost all countries globally. The Status Report of the German Circular Economy reveals that exports of corresponding environmental technology in 2018 exceeded 5 billion euros. In Germany, more than 300,000 people are employed in these fields of the circular economy, generating a gross value added of more than 28 billion euros (German Federal Association for Secondary Raw Materials and Waste Disposal (bvse) 2020: 18).

The success of this type of after-care environmental protection stands in contrast to Germany's inactivity in the consideration of various core aspects of the circular economy: the avoidance of waste, the high-quality closed-loop material cycles and cradle-to-cradle design as a guiding principle of innovative business models.

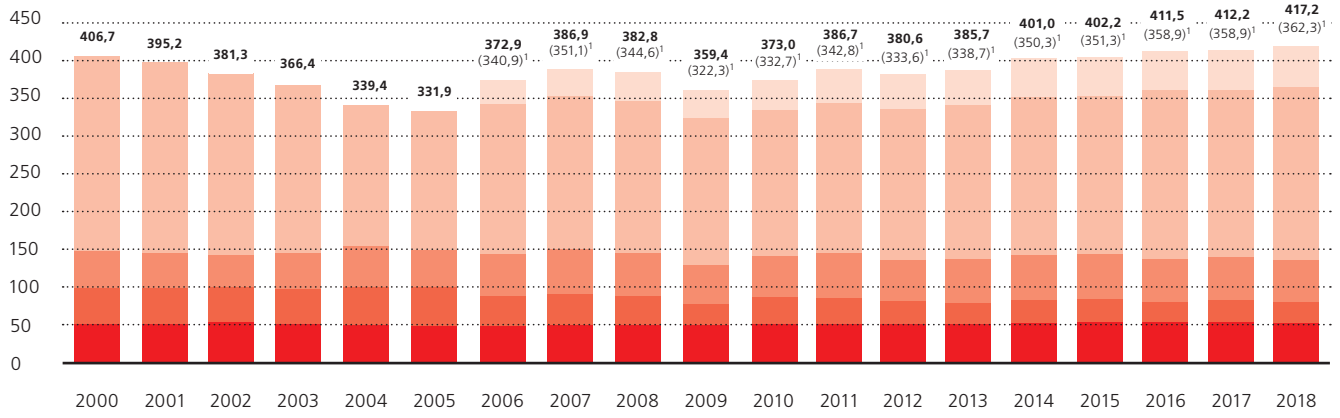
AVOIDING WASTE

„Measures of waste prevention and management are in the following order of priority: 1. prevention [...]."
(§ 6 para. 1 KrWG)

The following figure highlights the fact that, despite the completely unambiguous legal requirement for waste generation, the amount of waste produced in Germany

[1] The definition of general and quantifiable targets for resource conservation is methodologically awkward for a variety of reasons. As a possible guiding corridor, the German Environment Agency gives a target of eight to 10 tonnes of raw material consumption (RMC) per capita and year, cf. Günther/Golde (2015).

Figure 1: Development of annual waste generation in Germany (in millions tons)



[1] Net waste generation, excluding waste from waste treatment plants, surveyed as part of waste generation for the first time in 2006

[2] Not including waste from waste water treatment plants (EAV 1908), waste from the preparation of water for human consumption or industrial process water (SAB 1909), waste from soil and groundwater remediation (SAB 1913) and secondary waste leaving the disposal process as raw materials or products.

[3] Waste from the extraction and treatment of mineral resources

Source: German Federal Environment Agency (2020a)

has been continuously rising for years – even if not quite as fast as gross domestic product (GDP) rates. Similarly, raw material consumption (RMC) continues to climb and now exceeds 1.3 billion tonnes (Lutter et al. 2018: 40). This "relative decoupling"[2] of GDP to the amount of waste produced, is more a consequence of a decline in waste from mining, that is from structural change, rather than the success of waste prevention measures.[3] In many sectors, it can be shown that industry naturally strives to reduce material use and waste quantities per product, for example, through ever thinner packaging (Schüler 2020). These kinds of efficiency gains are overcompensated by rising production and sales volumes. For example, the amount of plastic packaging has more than doubled in the last 20 years, driven in part by changes in consumer habits, such as eating and drinking "to go".

CLOSING MATERIAL CYCLES

"The entire life cycle of the waste shall be taken as a basis for the observation of the impact on human health and the environment in accordance to the first sentence. The following shall especially be taken into account in this connection [...] 2. The degree of the conservation of natural resources [...]." (Section 6 para. 2 KrWG)

Germany continues to post one of the highest rates of recovery or recycling worldwide for most waste streams. However, measured this way, the proportions of waste recycled do not necessarily reflect whether industry actually uses the secondary raw materials recovered in the process. This means the quality of recycling processes – and therefore also the quality of recovered raw materials – do not play a role in these classic recycling rates. If we look at the Circular Material Use Rate[4], for example, as one of the European Commission's core indicators for the transformation to a circular economy, we see that its development in Germany has been stagnating for years and countries such as the Netherlands have now, for various reasons, clearly overtaken it.

Despite impressively high recycling rates exceeding 90 per cent for packaging, for example, the share of recycled materials in plastic packaging is around 11 per cent and a large part is still only 'thermally recycled', which simply means it is incinerated. The German economy is still largely dependent on primary raw materials with a supply situation that the European Commission considers 'critical' (European Commission 2020a). These primary raw materials must also be imported and are increasingly

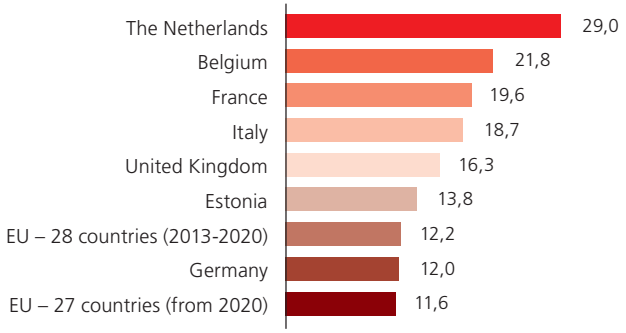
[2] The amount of waste generated per euro of GDP is falling in Germany, but economic growth means the amount of overall waste continues to rise. Hence, an 'absolute decoupling' is required.

[3] Such a slow 'decoupling' can also be observed at the European level, with the total volume now rising to more than 2.5 billion tonnes per year, cf. European Environment Agency (2021).

[4] The Circular Material Use Rate, also known as the circularity rate, is defined as the ratio of circular use of materials to total material use. This indicator measures the share of material recovered and put back into the economy, see Eurostat (2021).

exposed to price fluctuations. In the German Resource Efficiency Programme – the indicator for circular economy, named the Direct and Indirect Resource Savings Effects through Recycling (DIEREC) – meaning the conservation of natural resources through use of recycled materials, is less than 20 per cent. In Germany, a significant amount of recycling is conducted to meet quotas, but has not sufficiently benefited industry or the environment, thus far.

Figure 2: Circular Material Use Rate, 2018 (in %)



Source: Eurostat (2021)

THINKING IN CYCLES

"On the basis of the order of priority in accordance with subsection (1) [...] The technical possibilities, economic acceptability, and the social consequences of the measure, shall be taken into account." (Section 6, The waste hierarchy para 2 KrWG)

The business model of the linear economy is based on maximising material throughputs that become waste after products have been used for as short a period as possible. Following this logic, waste avoidance is primarily detrimental to business: if products last longer or are easier to repair, it decreases the sale of new products and the company's profits. The development of new, circular business models is needed so investments in circular design or take-back systems for their products actually pay-off from a business perspective.

Studies by the OECD and Circular Economy Initiative Germany (2020) pointed to the potential of such business models, which are often associated with higher initial investments – but can generate significantly higher returns in the medium- and long-terms. The fact is, however, there is negligible data available on their actual distribution and market relevance, or these models are otherwise considered to have only a "niche existence" (European Environment Agency 2018, 2021).

Table 1: Circular business models

	Circular supply	Resource recovery	Product life extension	Sharing	Product service system
Key characteristics	Replace traditional material inputs with renewable, bio-based, recovered ones	Produce secondary raw materials from waste	Extend product life	Increase the utilisation of existing products and assets	Provision of services rather than products. Product ownership stays with the supplier
Resource efficiency driver	Close material loops	Close material loops	Slow material loops	Narrow resource flows	Narrow resource flows
Business model sub-types	Cradle-to-cradle	Industrial,	Traditional long life, direct reuse, repair, refurbishment, reconditioning	Co-ownership, co-use	Product-oriented, user-oriented, result-oriented
Main sectors currently applied in	Diverse consumer product sectors	symbiosis, recycling, upcycling, downcycling Metals, paper and pulp, plastics	Automotive, heavy machinery, electronics	Short-term lodging, transport, machinery, consumer products	Transport, chemicals, energy

Source: OECD (2019: 25)

1.2 LIMITS OF TRADITIONAL ENVIRONMENTAL POLICY

The transformation to a circular economy is faltering in different areas of Germany, despite new evidence of the many corresponding advantages (Weber/Stuchtey 2019). This has undoubtedly come about for a number of different reasons, while the traditional instruments of environmental policy seem to be increasingly reaching their limits. This is again exemplified through the three fields of activity discussed above: the avoidance of waste, the high-quality closed-loop material cycles, and circular design as a guiding principle of innovative business models.

In order to avoid waste (the first step of the waste hierarchy), the EU-Waste Framework Directive obliges member states to create a waste prevention programme. This should encompass measures for avoiding waste as well as possible indicators and targets that are already implemented as well as those still in planning. In Germany, the Federal and State governments have developed a joint programme, updated at the beginning of 2021 (BMU 2021). From this came an evaluation of the previous programme that clearly highlighted that, although the waste prevention programme was perceived as being a helpful source of information, in practice it can hardly provide decisive impetus. This is exacerbated by the fact that the relevant actors responsible for prevention of waste, such as municipalities and associations, often lack adequate financial and human resources. In contrast, disposal costs are taken care of through waste disposal fees, while there is still no comparable mechanism for the prevention of waste. What becomes clear is that the generation of waste can hardly be prevented with the instruments currently utilised in waste management laws, since these are essentially based on the approach of hazard prevention, which, however, only applies to the prevention of waste in exceptional cases. Waste legislation only takes effect when the waste has long since been generated. Incentives for prevention, on the other hand, would have to be created much earlier in the value chain.

In order to increase the use of recycled materials, the new Circular Economy Act (KrWG), for example, provides for even stricter requirements for Federal authorities in the context of public procurement: Section 45 para. 2 to "shall give preference to products [...] which [...] have been produced through preparation for re-use, or by recycling waste, in particular using recyclates, or from renewable raw materials, [...]"Here, exceptions are only provided for in the case of "unreasonable additional costs". This is where practice shows that public procurement decisions cannot be shaped in essence by waste law. The shares of secondary raw materials, for example in the construction sector or in plastics, remain at continually insufficient initial levels. Similarly, there are requirements to design products in a recycling- or repair-friendly way in various laws on individual waste streams, such as the Packaging Act (VerpackG) or the Electrical and Electronic Equipment Act (ElektroG). But here there is a complete lack of concrete measures that would enable enforcement authorities to prohibit market access for individual products. Even regulations in the core area of waste law, such as requirements for the separate collection of waste in the Commercial Wastes Ordinance (GewAbfV), only have limited effects in practice due to weak enforcement as a result of tepid political will and personnel constraints. Sanction mechanisms are hardly provided for here. Overall, the various waste legislation regulations do not yet provide a consistent framework to actually promote the necessary transformation to a circular economy.

With the German Resource Efficiency Programme (ProgRess), the German Government has presented a comprehensive strategy for the protection of natural resources that identifies possible starting points along the entire value chain, and also includes the topic of "resource-efficient business models". Here, for example, ProgRess is to contribute to "supporting digital business models and identifying and taking into account possible risks [...]" (BMU 2020: 47). On this basis, research projects can be justified, or corresponding references can be anchored in the Federal Ministry for the Environment's 'Umweltpolitischen Digitalagenda' (Digital Agenda for Environmental Policy). Thus, they can indirectly and positively influence the framework conditions for circular business models in the long term. But this is inadequate for addressing the niche status of such approaches and the obstacles responsible keeping them small and specialised.

With Germany's National Sustainable Development Strategy, the High-Tech Strategy 2025 from the Federal Ministry of Education and Research, the raw materials strategy utilised by the Federal Ministry of Economic Affairs and Energy or the National Programme on Sustainable Consumption, there is also a whole series of other strategies that all interface with the issue of circular economy, without providing a consistent overall picture that would, for example, allow economic actors to align their investments with a jointly supported vision. In this context, the circular economy is not understood as a goal in itself, but is intended as an instrument to contribute to overarching goals, such as climate neutrality and resource conservation. In contrast to climate protection, however, resource conservation lacks concrete and quantified targets and sanction mechanisms, meaning it is only a guideline for industry with a limited capacity for actually triggering activity (Umweltbundesamt 2020b).

1.3 EUROPE SETS THE PACE

When it comes to the circular economy, the European Commission has clearly taken on the role of a pace-setter. The transition to a circular economy is an important cornerstone of the Green Deal as the most important strategic agenda of the new Commission and the associated goal of climate neutrality for Europe by 2050 (European Commission o. J.). The Circular Economy Action Plan, renewed in March 2020, defines key fields of action in conjunction with an extremely ambitious timetable and quantified targets (European Commission 2020b): By 2030, the volume of residual waste in Europe is to be halved and the Circular Material Use Rate – the share of recycled materials in the raw materials used – is to be doubled. In order to achieve this, the recyclability of products must be increased, among other ways, through a "right to repair" with specific strategies announced for various central waste streams such as textiles, ICT products or plastics. In the context of the circular economy, the roles of consumers, cities and regions are to be strengthened, and the interface with socio-political topics, such as new jobs and necessary qualification profiles, is also addressed. The action plan coordinated by Vice-President Frans Timmermans is, from the Commission's point of view, a central contribution to climate protection, but at its core it is also an industrial policy agenda to ensure the medium- and long-term competitiveness of the European economy.

Europe is highly dependent on imports of raw materials from politically unstable regions, so the circular economy is intended to help reduce this dependence and increase capital productivity in competition with other economic regions that tend to rely on low-level wages as well as social and environmental standards.

So far, the Circular Economy Action Plan is largely an announcement of measures, which in turn, often have yet to be implemented by member states. With the Single-Use Plastic Directive (SUPD), however, the Commission has proved it is prepared to massively intervene in the market to promote the circular economy, for example in the form of one specific product ban, which is rather symbolic in the overall balance, or the specification of minimum recycling quotas for PET beverage bottles (European Commission 2019). The timetable for implementing the Circular Economy Action Plan puts the Commission under massive pressure and certainly also weakens its negotiating position to some extent. But, at the same time, it increases planning security for industry, so that industrial players can base their investment decisions on this timetable.

2

INSTRUMENTS OF A CIRCULAR ECONOMY AS AN INTEGRATED POLITICAL APPROACH

It is clear that environmental policy instruments, such as waste disposal legislation, will be insufficient to overcome the current firmly-established linear economic system. Recycling quotas or minimum technical standards for treatment processes form important framework conditions and indirectly create economic incentives for improved product design and innovation in the direction of circular business models. These can doubtless be better coordinated with one another and more ambitiously designed. However, in the end, the main obstacle facing the circular economy in Germany is the lack of its integration into other important policy areas.

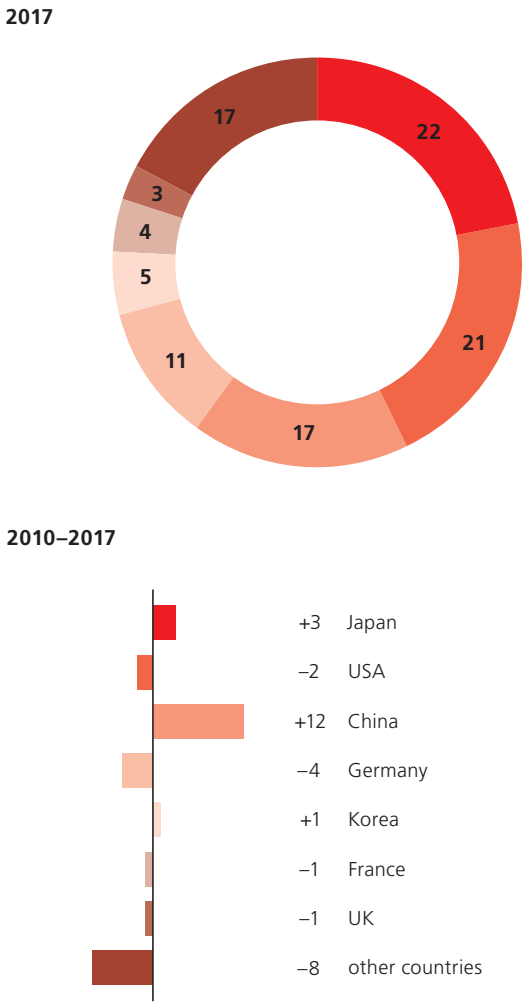
The circular economy is a cross-sectoral policy issue which, like climate protection, requires an integrated policy approach. In the context of the FES discussion series, a number of sectoral intersections were identified that will need to be addressed to successfully transition to a circular economy. The debate on the specific content and processes of such policy integration is still in its infancy in Germany, as this grapples with finding appropriate key regulatory levers for the circular economy beyond established environmental policy, and asking what the most significant barriers have been so far and what decisive driving forces could be in the future. In the following section, initial approaches and key points are identified both on a national and EU level. Alongside the more typical subjects, such as innovation and industrial policy, the section will also examine policy issues that have been given very little systematic consideration from the circular economy perspective.

2.1 INNOVATION POLICY AND RESEARCH

The transformation to a circular economy is essentially an innovation policy challenge, for which the generation and implementation of new knowledge concerning the functioning of systems and transformation of the existing linear system is essential (Schneidewind 2018). However, when innovation policy is considered in terms of how it relates to the circular economy, a study commissioned by the Federal Environment Agency from the Fraunhofer Institute for Systems and Innovation Research (ISI) concluded that: "the transformation towards a circular economy in Germany is still at an early stage of development and is not very dynamic" (Gandenberger 2021: 35). The study examined different functions of an innovation system, such as "knowledge development and diffusion", support for "entrepreneurial experimentation" and "market development", all of which are only slowly gaining relevance. The study reveals a high level of public interest in ideas, such as offers to extend the service life of products or waste prevention (which can be observed in the rapidly increasing number of "packaging-free" shops in Germany; cf. Kröger et al. 2020). The role of the European Commission is mentioned with regard to the notion of "influencing the direction of the search", such as establishing a consensus on necessary innovations and measures. However, the conclusion here is that "these initiatives in Germany – beyond state research funding – have apparently not contributed to a significant "mobilisation of resources" so far, or [they] do not manifest as ambitious political guidance" (Gandenberger 2021: 36).

An important aspect in this regard is research funding, a field where the concept of the circular economy as an integrated approach is only gradually gaining attention – despite the first funding programmes that support more innovative forms of research now emerging. In the context of the Research for Sustainability programme, the Federal Ministry of Education and Research has explicitly called for interdisciplinary research and the inclusion of practical partners – for example, in funding the Resource Efficient Circular Economy – Plastics Recycling Technologies (KuRT) programme – as well as coverage of entire value chains as a funding criterion. In contrast, the conventional funding instruments of the German Research Foundation (DFG) are, for example, still discipline-oriented in general, while integrated study courses devoted to the circular economy have not become significantly established in university education. This is increasingly reflected in the declining number of patent applications made by German companies active in the circular economy.

Figure 3:
Share of patents registered worldwide in the submarket "Technology for the waste industry" by country, 2017 (in %)



Source: the German Federal Association for Secondary Raw Materials and Waste Disposal (bvse) (2020)

2.2 INDUSTRIAL AND ECONOMIC POLICIES

As already described, the circular economy is a central component of the industrial policy agenda at a European level: one consequence of the transformation from a conventional linear economy to a circular economy should be that European industry can maintain its competitiveness. There is a tangible risk, however, that in the medium and long terms – although this advantage is essential if Europe is to remain competitive on the global market – the current efficiency advantage in linear production cannot be maintained due to the high wages and social and environmental standards in Europe. However, it will be possible to secure Europe's global competitiveness as an industrial location if it transitions to a circular economy. This will result in direct cost savings achieved through use of secondary raw materials and indirect effects coming to bear, such as through the establishment of new business models, increased innovation via new forms of cooperation and improved access to capital markets, where contributions to climate and resource protection are prioritised.

The circular economy is also viewed as a counter-model to contemporary "raw materials colonialism", a term describing the means by which individual economic powers secure access to raw materials through direct investment in emerging and developing countries, as China does in various African countries for example. Instead, import dependency should be reduced by recycling raw materials.

The Federal Ministry of Economy and Technology's Industrial Strategy 2030 also identifies the circular economy as an important strategic element in this context, referring to the raw materials strategy: "In the context of increasing global raw materials consumption and the finite nature of many primary raw materials, secondary raw materials are becoming increasingly important" (BMWi 2021b). However, with regard to individual measures there is a clear difference between securing raw materials, which is supported very specifically, for example, through untied loan guarantees or establishment of competence centres, and the subject of the circular economy, where there is relatively vague and non-binding talk of dialogue processes and support for research projects (measures 12 and 13; cf. BMWi 2019a).

Circular economy as an industrial policy – China's example

China provides a good example of coherent industrial policy development. In 2013, the cross-sectoral China Association of Circular Economy (CACE) was founded to achieve the realisation of a circular economy. Some 700 members from across the country are involved, with the main office alone staffed by 50 employees. As part of the 12th Five-Year Plan for 2011-2015, the "10 - 100 - 1,000" strategy was introduced to prepare for the nationwide implementation of the circular economy. It included the following measures: 10 circular economy pilot projects with a focus on recycling, 100 pilot cities such as Guangzhou and Suzhou, and 1,000 pilot enterprises or industrial parks nationwide (Dittrich et al. 2020: 52 ff.). Although thinking in terms of five-year plans is difficult to reconcile with the German social market economy, such a highly strategic approach to a circular economy policy has helped China become a major player in many technology areas within a very short period of time. In contrast, if we examine the German Government's COVID-19 stimulus programme, for example, it is obvious that it missed an opportunity to generate impetus for development of the circular economy (Fischedick et al. 2020).

2.3 SOCIAL POLICY

Up to now, the discussion surrounding the transformation to a circular economy has primarily focussed on the associated socio-economic benefits. For instance, the European Commission has suggested that up to 700,000 new jobs could be created in the European Union by 2030 as a result of implementing the Circular Economy Action Plan. In addition, existing jobs can be secured by the increased competitiveness of key industrial sectors (European Commission/Directorate-General for Communication 2020). However, this focus on net benefits should not hide the fact that a transformation on the scale of the circular economy will entail massive changes that will lead to economic difficulties for parts of the conventional linear industry, which will be forced to shed a great number of jobs. For example, according to industry sources, the ban on disposable plastic cutlery in the EU resulted in the loss of thousands of jobs (Skoda 2019). Such losses are most certainly offset, however, by the creation of new jobs in the production of re-usable alternatives as well as in the cleaning and logistics sectors – albeit most likely at different locations and with different qualification requirements. Research by the UK Waste and Resource Action Programme (WRAP) has shown what each additional net job resulting from the transformation to a circular economy ultimately means that in gross terms, two jobs in the linear industry are lost, and three new circular jobs are created in their place. This leads to massive structural change (Morgan et al. 2015). When one considers the required qualification profiles, high and low-income workers in particular will profit from the shift to a circular economy (bioeconomy in the high-wage sector, for example, and logistics in the low-wage sector). However, mid-income workers could experience net jobs losses (Mitchell 2015).

To ensure the circular economy continues to be perceived as an opportunity rather than a threat, these structural changes require long-term preparation and adequate socio-political measures to cushion the effects. Among these requirements would be major investment in education and training. With regards to what form these measures might take, it is worthwhile examining the advanced debates concerning the effects of digitalisation on the future of work.

Analogous to this would be a form of 'work insurance' that could be considered to cushion the respective risks (Hans et al.: 2017). Comparing the 'Energiewende' (energy transition) and circular economy as the central challenges of structural transformation in Germany, it is clear that the burdens resulting from the shift to a circular economy will not be as geographically concentrated as in the case of the energy transition – such as on coal-producing regions – although the overall extent of these shifts is likely to be similar.

Table 2
Qualification profiles in the circular economy

Closed loop recycling	Low qualified	Qualified	Professional
Closed loop recycling	4	4	1
Open loop recycling	4	2	1
Servitization	3	3	3
Reprocessing	2	5	2
Reuse	4	2	1
Biorefinery	1	4	4

Source: Morgan et al. 2015

What can be learned from global front-runners?

In the global competition for innovative approaches to promoting the circular economy, the Netherlands is regularly mentioned as a pioneer. This is in part due to its exceedingly high circular material use rate (see Chapter 2) of almost 30 per cent. Examining the reasons for this development, it emerges that it is a combination of diverse, intermeshing elements in the Netherlands that have considerably accelerated the transformation process.

- Early head start: In comparison with other countries, the Netherlands was cognizant of the circular economy at a very early stage. As early as January 2017, the National Agreement on the Circular Economy was established, in which the government, leading trade associations, small and mid-sized companies and also local authorities agreed on common goals and measures (Government of the Netherlands 2017).
- Commitment and monitoring: The subsequently developed programme, named Circular Economy Netherlands 2050, includes the clearly defined goal to shift the Netherlands to a completely circular economy by 2050 – with the interim goal of reducing national primary resources consumption by half before 2030. This goal is to be pursued by all government ministries and, analogous to the goal of carbon neutrality, it is a clear reference point for all government action.
- Comprehensive approach: Questions pertaining to waste disposal law in the context of the circular economy have a comparatively low priority in the Netherlands. There is a much stronger focus on financing issues or support for innovation by means of incubator programmes for start-ups in collaborations between industry and research facilities such as, for example, 'Yes! Delft' at the Delft University of Technology campus.
- Innovative policy instruments: With its so-called Green Deals, the Netherlands has developed an approach to promote regional cooperation through private law agreements known as covenants. This ensures that clear objectives are defined, while providing an opportunity to change individual regulations in environmental and planning law on a trial basis, if justified by benefits for the environment and society.

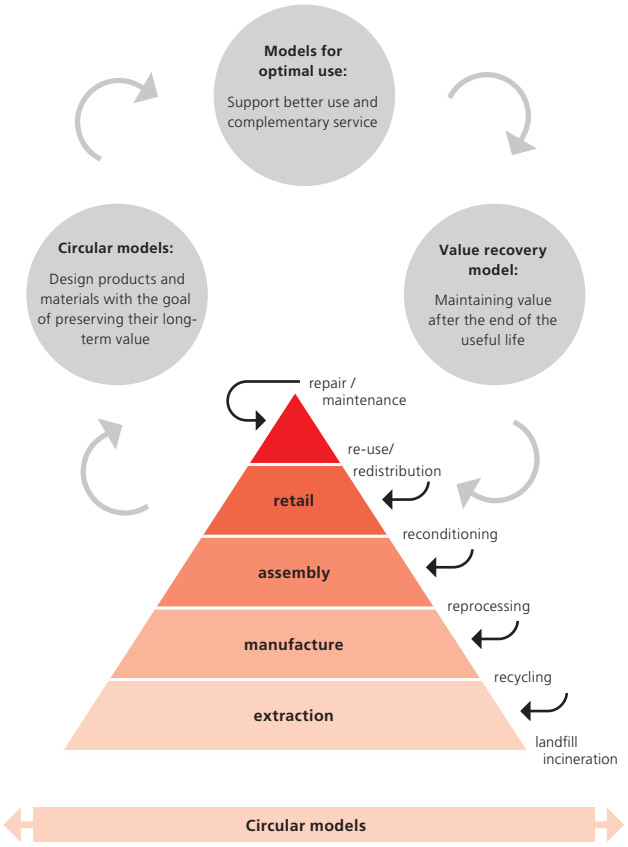
2.4 NECESSITY OF A POLICY MIX THROUGHOUT THE VALUE CHAIN

The discussion of various instruments clearly shows that no single instrument can facilitate the transition to a circular economy on its own. Such a complex transformation process requires a coordinated approach from different perspectives, and the fields of action mentioned here are certainly not exhaustive. The current mix of different types of instruments is also notable, from more informational instruments to strict regulatory policies and purely market-based incentives. As a whole, the slow speed of these transformation processes seems to indicate that voluntary measures very quickly reach their limits. The existing directives, on the other hand, are still mainly restricted to conventional waste disposal legislation.

To achieve a successful policy mix, it is essential that individual measures become more consistent. In many areas, possible synergies between individual instruments have yet to be fully realised, while contradictory regulations and opaque overall goals remain apparent. Where does the circular economy actually contribute to climate and natural resource protection? In this context, it will be up to political actors to mediate such negotiation processes in a meaningful way.

The following diagram illustrates the necessary life-cycle perspective of the circular economy, which requires a coordinated overall approach from the extraction of raw materials and product design through to recycling. It also helps us extrapolate the necessary market interventions and regulations.

Figure 4:
The circular economy in the context of EU taxonomy on sustainable financing



Source: Hirsch et al. (2020)

INTEGRATED CIRCULAR ECONOMY POLICY IN A MULTI-LEVEL GOVERNANCE SYSTEM

A broad-reaching undertaking, such as the transformation to a circular economy, raises the question as to which levels of a multi-level governance system are best suited for each respective task. In addition to the consistency of the approach, the coherence of policy-making from local to global level will play a pivotal role in the success of realising a circular economy (Wilts et al. 2016).

As illustrated, Europe is now the global region best prepared in many areas to set a course for the circular economy. In order to compel global corporations to comply with such regulations in production processes, it makes sense to define the durability or recyclability of a product on a European level as opposed to merely a national level, as happens with the European Ecodesign Directive. Such collective initiatives bundle the collective buying power of EU citizens, which obviously makes them much more effective. The example of REACH, the EU chemical regulation, demonstrates that the EU is capable of developing regulations that can be implemented on a global level, known as the 'Brussels Effect' (Bradford 2020). In other areas of policy, such as trade, EU member states have already formally abdicated many of their competencies to the EU, which regulates the standards and access criteria for the single market. In some areas it could even be argued that global agreements are appropriate, for example in the case of standards for packaging labels.

At the same time, the district and regional levels will assume a more central role, if the transition to a circular economy is to be successful. Various pilot projects in pioneer cities, such as those involved in the Urban Agenda Partnership on Circular Economy (Jentoft 2018), have demonstrated down to the local neighbourhood level how the circular economy can work and how it creates new jobs. This also reveals which specific technical developments are needed in future. They are, therefore, essential living laboratories in which innovations are able to develop until sufficiently mature to replace linear structures. These pilot projects play a role as places of innovation. Local administrative districts also gain the opportunity to integrate the concept of a circular economy into their infrastructure and spatial planning. This is supported, for example, by regional approaches to industrial symbioses or by local urban mining land registers that systematically map the raw materials contained in individual buildings or entire neighbourhoods to bring them into the cycle more efficiently (Müller et al. 2017). When looking at the first steps of the waste hierarchy, namely waste prevention and re-use, it becomes evident that the necessary structures must be conceived to suit the prevailing situation at a given location. In future, however, it will be necessary to be more precise in agreements about the allocation of responsibilities, especially when issues of financing are involved. For instance, one of the tasks of the new waste prevention programme is to establish whether local authorities can finance waste prevention measures through waste disposal charges (BMU 2021). Moreover, the role of federal states in the circular economy is still unclear and is interpreted in different ways. Some federal states, such as North Rhine-Westphalia and Saxony, have commissioned circular economy or zero waste programmes, whereas other states have focussed more on raw materials strategies. In many areas, the task of the federal states is to enforce government directives, which is also a key aspect of transitioning to a circular economy.

In view of this complex network of functions, both on supranational and sub-national levels, the actual scope for action on a national level remains an open question: is it possible in Germany – an EU member state with a federal structure and constitutionally-defined local public services – to create mandatory targets and a framework for the circular economy on a national level? Considering the policy areas outlined above, the answer can only be "yes". In many fields – including industrial, financial or research policy – the federal government will remain the most suitable level to meaningfully coordinate processes and policy issues relating to the circular economy. In the past, the European Commission mainly relied on directives that afford member states a considerable degree of latitude in the implementation of defined minimum standards. However, the basis for this would need to be a clearly defined vision of the future circular economy in Germany that is shared by all involved actors, or an integrated strategy for defining the path to this goal.

DIGRESSION: DIGITALISATION AND THE CIRCULAR ECONOMY

In order to confront the aforementioned challenges, it is essential to more rigorously coordinate the flow of materials and information when transitioning to a circular economy. Information must be compiled and archived on the amounts and especially the quality of products and raw materials they contain. This information must be an integral part of the cycle, so waste can become a processable resource. One of the key challenges here is to effectively generate and process information on the composition of every single product, its pattern of use, where it ends up in the waste disposal system and ensure this information is subsequently accessible. All of this is necessary so that functioning markets and cycles can be established in the next stage. This will make efficient, market-based solutions possible instead of solely relying on regulation.

Up to now, it has not been possible to resolve many of these information deficits. In many ways, the transformation to a circular economy is a revolution in making different information more transparent, a process in which digitalisation can undoubtedly play an important

role. It could be the missing link on the path to realizing a circular economy. Considerations on how this could be achieved are explained here by way of example:

- **Digital twins** of production processes (so-called 'cyber physical systems') ensure that products bear information at least during the entire production process. For the circular economy, this information must cover the entire life-cycle and also specify environmentally-relevant details, such as material composition and ecological footprint. This will help reduce information asymmetries in a meaningful way.
- **Innovative sensor technology** allows data to be generated and collected in real time in Industry 4.0. Information about the location where waste occurs, its precise material composition etc. can be geographically and temporally defined (**fast data**) and passed to other companies, which in turn can plan their production processes. New approaches to data analysis, for example based on artificial intelligence (**big data**), can then deliver and project information about subsequent use and efficient logistics solutions, amongst others.
- The consolidation of supply and demand for waste or secondary raw materials can be revolutionised by internet-based solutions, as we are already witnessing today in the distribution of products. A future **automated market and logistics platform** (a kind of Uber for waste materials) could reduce search and transaction costs. Moreover, economies of scale can be achieved more easily due to better information about the quantities of materials.
- In an intelligent, integrated system it is even conceivable that recyclable products could automatically self-generate their own markets via **Internet of Things** by marketing themselves on such platforms using information about their composition and possible applications. Today, some recycled materials are already less expensive than primary materials and this advantage could be strengthened even further. Recyclability would then bestow a product with a competitive advantage.
- **Blockchain** applications, on which the virtual currency Bitcoin is based, for example, could relay anonymised and encrypted information without giving competitors the opportunity to extrapolate information about a firm's own product technologies.

At the same time, all these technological approaches and the associated deployment of information and communication technologies require considerable amounts of energy and raw materials: today around 4 per cent of greenhouse gases are attributed to digitalisation – with enormous growth rates (BMU n. d.). Thus, digitalisation of the circular economy is not an end in itself: a relevant framework is necessary to contribute to real climate and resource protection: "To ensure that digitalisation does not become an accelerant of environmental destruction, it will require strict guidelines. If we succeed in realising digitalisation in a sustainable way, it has the potential to support the social-ecological transformation" (BMU o. J.). With its 'Umweltpolitischen Digitalagenda' (Digital Agenda for Environmental Policy), the German Federal Environment Ministry has provided an initial outline of tasks associated with it. However, many of these – such as a Digital Product Passport based on sustainability criteria – are still in their infancy.

3

OUTLOOK: KEY POINTS OF A CIRCULAR ECONOMY STRATEGY

In view of the numerous technologies that are under development, potential circular business models and possible regulatory approaches, the question of prioritising a necessary framework arises: What are the key points to advance the transformation to a circular economy at the required speed with high efficiency?

In approaching this question, two points should be mentioned:

- The circular economy must learn more from climate protection.
- The circular economy needs new formats and clear responsibilities.

WHAT CAN BE LEARNED FROM CLIMATE PROTECTION?

In terms of challenges faced, climate and resource protection via the circular economy are, of course, very different. They exhibit totally different structures in terms of their actors and require specific problem-solving approaches. Yet, in many areas, they have great similarities:

- Both are environmental policy challenges that demand a fundamental transformation process and cannot be resolved by individual actors. Yet, at the same time, they show considerable socio-economic potential for German industry.
- Both of these subject areas are also associated with socio-political challenges ('energy poverty'), the resolution of which will be decisive to gaining public acceptance for individual measures.

The discourses on this issue are, however, at completely different stages of evolution. Climate policy can draw on almost 30 years' experience with different instruments. The renewable energy feed-in law, the forerunner of the German Renewable Energy Sources Act (EEG), was passed in 1991 and became a prototype globally for a market-based instrument to tackle climate change.

Therefore, it would make sense to engage in a more intensive exchange of experiences in this area to establish which climate policy concepts and approaches can be applied in the circular economy:

- For example, what can be learned from the EEG about establishing minimum recyclate quotas?
- To what extent can concepts like the CO2 tax be transferred to the individual ecological footprint or 'ecological backpack' of a product? What role does the use of such tax revenues play in this? Would it make sense to apply concepts, like the Emissions Trading Scheme, to the circular economy?
- Is it conceivable to establish a comprehensive set of regulations, comparable to those used in climate policy, for the circular economy? Would it be possible to develop sector-specific targets for the circular economy which could be enforced by financial penalties in the case of non-compliance?

Beyond the issue of applying instruments, proponents of the circular economy should also consider how to gain broad political support for such a profound and large-scale transformation process.

PROCESSES, PRIORITIES AND FORMATS

There is evidently no shortage of proposals, road maps or key issues papers in support of the circular economy presented by diverse political interests, from research projects or representatives of individual lobby groups.[5] They all encompass numerous ideas – ranging in degrees of detail – for instruments, approaches for specific value chains or suggestions for quantified targets within a circular economy. In view of the faltering transition to a

[5] This list is not exhaustive, e.g.: Langsdorf (2016), Müller et al. (2020), Hoffmann (2020), BDE (2021), VCI (2020) or the Circular Economy Initiative Deutschland (2020).

circular economy, three political tasks can be identified that would build on this and reposition Germany as a global leader in this field (although this demands the proactive moulding of European framework conditions; the mere 1:1 implementation of EU requirements will not be sufficient in future).

1. **Prioritisation.** Comprehensive transformation processes towards the circular economy – from product design to disposal – are possible at every stage of the value chain, as well as for every individual material and waste stream. What appears to be an advantage also has its drawbacks: from the perspective of political decision-makers and companies, there is a confusing variety of possible measures that could contribute to the circular economy in different ways.

   Clear, transparently derived political priorities would be of enormous help, for instance in guiding commercial actors when making long-term investment decisions or in research development. In view of the complexity of potential side effects and possible trade-offs between individual fields of action, many areas require better data and more research. Though, in many areas, what is needed is more political assessment of the scope of action and feasibility along the entire life-cycle. This is not a matter of 'either / or', it is about planning and investment security and guard rails for medium-term developments.

2. **Defining responsibilities.** No single actor can realise the circular economy alone in the practical sense nor in terms of the necessary political framework. As a cross-sectional task, the circular economy requires new forms of cooperation along the entire value chain, and this will involve many diverse actors. However, this also raises the issue of allocation of responsibilities to achieve success and for steps still to be taken. If we compare the circular economy with conventional waste legislation, it becomes very clear which parties are responsible for compliance with threshold values or the attainment of facility-related recycling quotas. In the circular economy, it is often far more difficult to assign responsibilities. For example, who exactly is responsible for failing to ensure a significant reduction in the total volume of waste in Germany?

   Taken in this context, the circular economy requires clearly designated responsibilities, for individual processes and their results. The latter requires, among other things, a set of indicators that document developments in the various fields of action and subject areas. For example, how can it be determined whether products are, on average, becoming more durable and/or repair-friendly or whether packaging has actually become more recycling-friendly? Parallel to this, there would be substantive responsibilities based, for example, on the 'Klimakabinett' (Climate Cabinet) in combination with dedicated staff teams in various ministries. Analogous to the Climate Protection Act, responsibilities could be defined within the framework of a national circular economy strategy, as has already been developed in various countries.

3. **Transparency about opportunities and risks.** In terms of protecting the environment and our natural resources, there is no alternative to a transition to a circular economy: the linear economy is ultimately travelling down a dead-end street. Those actors who reposition themselves in time irrespective of whether they are individual companies, industrial sectors or entire national economies will significantly increase their competitiveness and tap into new economic potential. However, when considering the opportunities, it is important not to lose sight of the associated risks and consider the potential losers. The linear economic system is so firmly established because it has made Germany a successful business location, and broad sections of the population continue to benefit from this today. The transformation to a circular economy will inevitably give rise to profound uncertainties that have rarely been addressed up to now.

   In this regard, political support is needed to address such risks and concerns at an early stage and prevent key players from obstructing the transition. As outlined above, this must include clear concepts for the communication of circular qualification profiles, as well as a political discourse on how the gains and losses resulting from the transition to a circular economy can be distributed fairly. Many stakeholders at the beginning of the supply chain, such as packaging manufacturers, are already questioning why they should increase the recyclability of their products at enormous financial expense if the recycling industry would ultimately be the main beneficiary. Closely linked to this is the risk of oligopolisation of entire sectors: with a view to optimising the entire product life-cycle, large stakeholders will be tempted to gain complete control of value chains – from product design to disposal – to secure secondary raw material sources. From the point of view of the circular economy, this may even make sense. However, from a competition or consumer protection point of view, completely new and scarcely discussed questions then arise concerning the long-term safeguarding of innovative dynamism.

CONCLUSION: THE CIRCULAR ECONOMY AS AN ORGANISATIONAL TASK FOR POLICY-MAKERS

The considerations expressed here regarding the necessity of the circular economy, possible instruments and the necessary framework for its realisation make it clear that the transformation to a circular economy must be understood as an urgent organisational task for our politicians globally. The conventional instruments of environmental policy and waste legislation, in particular, are evidently being stretched to their limits in the context of such a comprehensive process of change. At the same time, it is clear that the market cannot achieve this goal on its own – especially not at the necessary speed. Innovative policy approaches are therefore required, but above all, an integrated approach that communicates a positive vision of the circular economy and consequently prepares the ground for social acceptance. A national circular economy strategy could be an important building block for such a process.

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Imprint:

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Friedrich-Ebert-Foundation
Editor: Division for Analysis, Planning and Consulting
Godesberger Allee 149, 53175 Bonn
Fax 0228 883 9205

Orders/Contact: apb-publikation@fes.de

ISBN: 978-3-98628-095-6

Cover motif: © picture-alliance / Sergio Goya
Design concept: www.stetzer.net
Print: www.bub-bonn.de

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