

Policy Paper §2: The Four Concentric Cycles of a Circular Economy



Policy Paper §2: The Four Concentric Cycles of a Circular Economy, Teodor Kalpakchiev, the-enpi.org, 2016



Current State of Affairs

In the contemporary world, we are evidencing a number of important processes that begin to take shape. First of all comes the anti-globalization sentiment that has spread as a reaction to one's inability to adjust to global competition both in terms of reaching sufficient efficiency of the factors of production, such as input resources, usage of available technology and human capital, as well as finding the sufficient means for ensuring an adequate level of consumption through monetary exchange with means accumulated via economic activity. In short, both producers and wage workers outside the most-developed core in the global economy are finding it hard to create new production capacities that correspond to all environmental standards, as the initial investment is too high and outputs would need to compete with established, stronger

This work is licensed under a [Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License](https://creativecommons.org/licenses/by-nc-nd/4.0/).



names, while workers do not see any point in further qualifications, as they would hardly bring them any additional benefit.



What would be the opposite of globalization? Some would call it encapsulation in the confines, or in a more modern term, the boundaries of a country's territory. Therefore, the natural endowment of a country must be sufficient to feed its population and supply its factories with resources. In a perfect polity, energy is produced solely by means of the earthly forces, is sufficiently cheap and decentralized to avoid natural monopolies. As often strong economies are in need of three or four times more non-renewable, resp. extracted resources to function, a precondition for that would be turning them to renewable ones through a closed loop. Enabled by high-quality recycling, repair and upscale industries, digitally organized cities and logistics and a revitalized model for a greener, social democracy sustained through education and training the new economy would be much less dependent on imports of resources, resp. political intrusion. Considering that the post-sovereign world is transforming into regions, one can easily grasp that there would be two options. One would be to continue with the current model of resource extraction that is having detrimental environmental externalities and is possible only in regions richly endowed with resources per capita of the population, while the other one would be the total encapsulation within the region, while focusing on turning the non-renewable resources to renewable.

Having identified that the only exit option for EU is namely the second scenario, the European Commission came up with the relatively ambitious second version of the circular economy, which states that the *“The circular economy will also need to develop globally”* [1]. Strategically, what it aims is to be at the forefront of the adaptation, which would allow it to foster and frame the environmental dialogue alongside the principles of the Circular Economy, as well as to set the regulatory standards for sustainable production of goods, which would allow it to remain competitive at least on its own

This work is licensed under a [Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License](https://creativecommons.org/licenses/by-nc-nd/4.0/).



territory and the wider European market. The latter is being created by means of a network of Deep and Comprehensive Free Trade Agreements with the European Neighbourhood, where the EU is having stronger negotiation power and is meant to both supply EU with sufficient natural resources and cheap labour, which it is in dire need of. The encapsulation of the European Union would require that its geographical borders are sufficiently big, so as to be on equal terms with fast-developing economies, such as the constituents of BRICS.



What Exactly is the Circular Economy?

The Circular Economy can be framed within the domain of economic development, as it hovers over the idea of creating recycling, renewable energy and logistical infrastructure, upgrading the methods and the outputs of production to make it more sustainable and increasing the wage growth by means of providing additional employment perspectives and increasing the value of the produced goods. It can thus also be premised on the green economy, as it preaches that the adaptation of production capacities includes limiting resource inputs, reducing energy usage with preference towards green energy and reducing the emissions of greenhouse gases. It can also be understood as a diversification strategy, as it is not only dependent on high-value production, but also the emergence of a strong service economy, where performance contracting would allow the emergence of a repair and upscale sector, which requires highly qualified technical personnel and results in economic stabilization due to the predictability of monthly instalments paying for leased goods.

One can attempt to explain it as a slowly-emerging, natural process of highly-needed change, which would result in potential cool-off of the economy, while providing it a long-term boost in terms of non-GDP related progress. In its complete form, it will be possible only in highly industrialized countries or such hosting a strong financial sector, while in the developing world, it will have to be limited to adaptation of the agricultural,

This work is licensed under a [Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License](https://creativecommons.org/licenses/by-nc-nd/4.0/).



waste, water and energy sectors. Its implementation is definitely dependent not only on the available monetary resources, but also on the ability to mobilize exogenous stressors, such as public policies, market interventions, education and research in its support. These will have to consider the underlying principles of the Circular Economy, whose number has doubled to six, namely *reduce, reuse, recycle, recover, re-manufacture, redesign*[2]. In a Circular Economy, resources remain closest to their original place of extraction. Philosophically speaking, the Circular Economy is way to construct a society harmonious with nature by means of emulating the dynamic, which it has created over time. The elements of a Circular Economy are thus understood as an integral parts of a system and analysed both in sub-systems, as well as a part of the whole.



Micro cycle

The first, lowest, “micro” cycle of analysis deals with products and their adaptation alongside the logic of eco-efficiency. In a Circular Economy, products do not end their life – they are manufactured with high-quality materials, which allows high levels of durability. Mechanical and performance parts have undergone massive standardization, which allows for interoperability and interchangeability with other similar products. Furthermore, they are designed with the idea to be not only easily repairable by the customer himself, but also easily upgradeable. Had they reached the end of their operational activity, then they must be easily disassembled and recycled, which would mean that impurities must be minimized. Products are smart and interconnected through the Internet of Things, operate under open-source software and have a life cycle defined by digital identities fostered through mini-RFID labels. The latter would allow their easier decomposition into separate material flows, appropriate rescaling or sourcing towards a new user through an established infrastructure of reverse logistics. Although slightly more expensive, they utilize the possibility of establishing a leasing society, where performance contracting ensures both the timely payment of installments and

This work is licensed under a [Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License](https://creativecommons.org/licenses/by-nc-nd/4.0/).



the continuous hardware support. Additionally, their higher cost and endurance will allow the emergence of tele-living solutions, such as renting of electric cars, procured with blended public and private financing and charged at their docking stations with renewable energy.



Meso cycle

The meso cycle of the circular economy works on the principles of eco-effectiveness, which incorporate the design requirements of products and expand them with a number of actions. Among them is the improvement of the energy and CO₂ profile of the industry through sanitation, carbon capture, but most notably – resource efficiency achieved through synergies among interconnected capacities. While enterprises should be powered by renewable capacities created with mature technologies, it aims to transform resource inputs into renewable flows by reusing, e.g. wood splinters for empowering waste-to-energy capacities, which are connected with district heating and whose end products can be used, for example, for pharmaceutical products or fertilization. The human factor can also be turned into a part of such a circular loop through rotation of tasks, turning the production facility into a living environment and achieving harmony with its surroundings. Hence, investment in research of both immature technologies (e.g. carbon capture) and less innovative adaptation techniques (resource preparation, efficient combustion, belt transportation, etc.) alongside the focus on recycling capacities should be shared between the private and the public sector. In the utilities sector, the Circular Economy can be used to increase the synergies between waste and water treatment plants, such as adjoining purification infrastructure, using waste water for irrigation, erecting small-scale hydroelectric plants, etc. The biggest problem with the meso level of adaptation is that most of the capacities are dispersed geographically, making thus the planning of new co-joined enterprises a much more viable solution.

This work is licensed under a [Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License](https://creativecommons.org/licenses/by-nc-nd/4.0/).



Macro cycle



The macro cycle of the Circular Economy incorporates and creatively deconstructs numerous sustainability visions, such as interpreting the urban environment as a socio-technical flow of resources, thus for example planning for the easier disassembly of the built urban environment, as well as of grand infrastructure solutions intended for public usage. It attempts to improve resource efficiency through economic modelling and ICT solutions, such as the optimization of urban traffic through a system of sensors, surveillance cameras, satellites and cloud services, which would allow the user to make informed choices or the contraction of the width of railways and road infrastructure. Within the living spaces, it supports the advancement of decentralized renewable energy production, as well as the optimization of domestic resource and utilities usage through a system of sensors, servers and OLED displays giving feedback. Preference is given to sustainable means for urban transport, such as light bikes and light railways (e.g. trams), with the latter being also used for materials' transportation and services. The IoT can also enable the creation of a resource market of repair parts, recycle materials and decommissioned elements from the built urban environment. This will be made possible through the erection of "pull"-type reverse logistics, which combine different resource flows and channel them to the industries in need. Another target is the full abolishment of fossil fuels through electrification empowered with sustainable energy, including of personal vehicles. Strategies for improving the harmony with nature, such as green roofs, urban gardens, shortening the cycles of bio-production alongside the ideas of bio-regionalism, using biodegradable materials for packaging and probing of topsoil, etc. are also embedded in the vision.

Horizontal Cycle

The horizontal cycle analyses restrictions to the advancement of a Circular Economy, which are connected with human behaviour and attempts to target them through the adjustment of education plans, communication instruments and further research. Fundamentally, as the last cycle of the Circular Economy it incorporates all the previous ones.



Towards a Global Circular Economy

Considering the increase of popular discontent with the effects of globalisation, the Circular Economy can provide the much needed answer for a transition to a new model, which reduces resource usage, creates employment and contributes to mitigating climate change. Whilst embedded in a communication by the European Commission, due to the pressing questions on the future of Europe, its realization as an adaptation method that needs to be embedded horizontally in all sectoral policies has not gained the sufficient momentum. What is more, outside the Brussels Bubble, the vision has been mainly employed by the private sector, which constitutes a risk for its transformation into a yet another public relations strategy, further wealth concentration or in the best case – corporate social responsibility with limited effects. The focus needed is the realization of possible synergies between climate, energy and water diplomacy, a domain, which the EU has strongly occupied since the signing of the Paris accords and the employment of the Circular Economy as the official strategy for technical adaptation alongside the global new climate deal. Essentially, this means that the links between the Commission and the UNFCCC Secretariat in Bonn must be strengthened and that the external dimensions of the EU's environmental policy must be directly embedded into the public policy dialogue with other regional organizations.

This work is licensed under a [Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License](https://creativecommons.org/licenses/by-nc-nd/4.0/).



[1] *European Commission, Closing the loop – An EU action plan for the Circular Economy, 2.12.2015, <http://bit.ly/1MVjZGf>*



[2] *I.S. Jawahir and Ryan Bradley, “Technological Elements of Circular Economy and the Principles of 6R-Based Closed-loop Material Flow in Sustainable Manufacturing”, *Procedia, CIRP 40, 2016, p. 103–108**