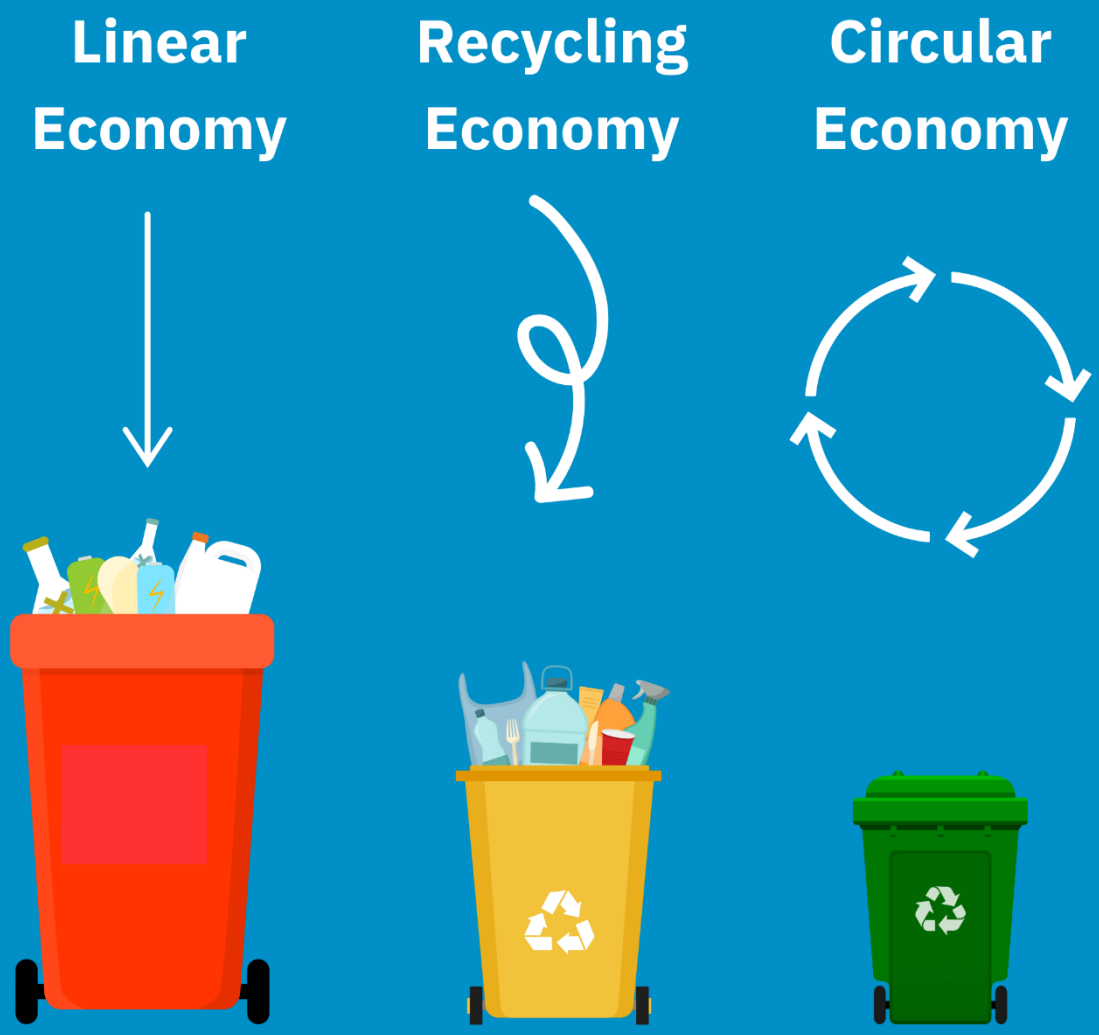
Present and Future of Circular Economy in Europe



E4S White Paper
2024-2

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February 2024

Enterprise for Society (E4S) is a joint venture of the University of Lausanne through its Faculty of Business and Economics (UNIL-HEC), the Institute for Management Development (IMD) and the Ecole Polytechnique Fédérale de Lausanne (EPFL), under the stewardship of its College of Management of Technology, with the mission of spearheading the transition towards a more resilient, sustainable, and inclusive economy. E4S is committed to training the next generation of leaders, inspiring economic and social transformation, and promoting change by strengthening start-ups and boosting innovation.

Acknowledgements. We are grateful to Dunia Brunner and Nils Moussu who wrote Boxes 1 and 2 on the status of Circular Economy in Switzerland. We also thank Martyn Wakeman (EPFL), Gino Baudry (EPFL), Paola Paruta (EPFL), Jean-Pierre Danthine (E4S, EPFL), and Jean-Philippe Bonardi (E4S, UNIL) for their valuable comments and feedback.

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EXECUTIVE SUMMARY

Despite efforts to increase circularity, to date, the European economy remains highly linear. To sustain our lifestyle, we need 18 tonnes of materials per person per year, 1.5 of which are landfilled. The raw material consumption keeps increasing, the waste production remains high, and the level of material recovery is low: only about 12% of materials are "circled".

This linear extractive economy is a key driver of environmental pollution and contributes to 6 out of 9 planetary boundaries being breached [1], [2], [3]. Resource extraction and use are responsible for about half of the global greenhouse gas emissions and 90% of the loss in biodiversity and water stress. Those issues are worsened by plastic pollution.

The overexploitation of natural resources is expected to worsen as material use is projected to double by 2050 [4]. The electrification of the economy will increase the demand for critical raw materials, such as lithium. The associated pollution leads to significant impacts on health and economic loss, thus calling for urgent societal changes.

The Circular Economy (CE) is critical to reducing resource consumption and achieving net zero by 2050. The CE is a regenerative model that reduces material use, prolongs products' lifetime, reuses and recycles resources rather than disposing of them as waste, designs out pollution, and regenerates natural systems. CE strategies aim to narrow (use less), slow (use longer), close (use again), and regenerate (make clean) material flows.

This paper explores the present and future of the circular economy in Europe, through the lens of the EU net-zero objective. Our goal is to understand the relative contribution of CE strategies to the EU's target-emission pathways, across sectors and products. To do so, we use the EUCalc model to simulate the long-term strategies of the EU towards 2050 and their impacts on greenhouse gas emissions and material demand.

As of today, the EU policies only include milder improvements around circularity for the years to come and miss the 2050 net-zero target. In the baseline scenario, which builds on existing policies, the EU economy improves mainly on recycling rates and energy efficiency. However, little is done on the other principles of CE, such as narrowing, slowing and regenerating material flows. As a result, GHG emissions are only reduced by about 60% with respect to the 1990 level.

A systemic shift in production and consumption patterns towards a more circular economy would allow us to both reach net zero and reduce material demand by half. Following the European Green Deal, The European Commission is currently revisiting and strengthening its environmental policies. It is therefore likely that the deployment of CE actions will accelerate, across all four ways of managing flows in a circular way. This acceleration is necessary to reach the net-zero target by reducing the number of travels and owned appliances, improving the material efficiency and the share of recycled materials, and switching to regenerative construction materials (e.g., timber and natural fibres).

However, we need to keep in mind that this is not a silver bullet, as even with all these drastic changes in place, the demand for some materials will still increase. There are trade-offs between decarbonization and material use, especially around lithium and graphite: the technological changes will still require large amounts of these two materials, raising questions about the environmental and human impacts of extracting them. In addition, there are more planetary boundaries than climate change to address, which will require higher regulatory efforts.

While these drastic changes may seem unrealistic now, we need to realize that, up until the

end of the 19th century, our economy was already mostly circular. We now need to find back the equilibrium between resource management and progress, "transition back" to a more circular economy, and close the circle.

KEY TAKEAWAYS

1. **Circular economy strategies are crucial** to limit the impingement upon **planetary boundaries** and social foundations.
2. While legislative and operational efforts around circular economy are being implemented, **the European economy is still mostly linear**.
3. **Current CE strategies and policies are not enough** for the European economy to reach **net zero by 2050**.
4. **A systemic shift in production and consumption patterns** towards a more circular economy would allow us to both **reach net zero** and **reduce material demand** by half.
5. The **demand for some critical raw materials** such as lithium and graphite will still **increase** while transitioning towards net zero.

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