NEWSLETTER #4 | 2024

CIRCOMOD
CLIMATE ACTION AND CIRCULAR ECONOMY

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If you want to inquire more information about the project, explore http://circomod.eu/

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Dear followers of the CIRCOMOD project,

We're excited to share some of the latest developments from the CIRCOMOD project!

Over the past few months, our team has made significant progress. We've published several noteworthy scientific articles, including in high-impact journals such as Nature. We've also deepened our engagement with key policy stakeholders, including the European Environmental Agency, the OECD, the European Commission, and national policy institutions. Our work has been actively promoted through workshops, dialogues, and blog articles.

One of the major highlights of 2024 is the prestigious recognition of our scientific leader, Professor Detlef van Vuuren, who has been awarded the 2024 Spinoza Prize—the highest scientific honor in the Netherlands. Often referred to as the "Dutch Nobel Prize," this award reflects the outstanding impact of his research on global sustainability and climate policy.

Our collaboration with other research initiatives is also expanding, and we're eager to showcase the synergies emerging from these partnerships. Thanks to the dedicated efforts of our team, CIRCOMOD continues to deliver valuable insights into circular economy modeling and its role in climate mitigation.

For more details, we invite you to explore this newsletter—and stay tuned for more exciting updates ahead!

Warm regards,

The CIRCOMOD team

Congratulations to Detlef van Vuuren, with the awarded Spinoza Prize 2024

We, the CIRCOMOD team are very proud of our project leader, **Professor Detlef van Vuuren** who has been awarded the 2024 **Spinoza Prize**–the highest scientific distinction in the Netherlands. The award, granted by the Dutch Research Council (NWO), honors Detlef's outstanding contributions to global environmental modeling, scenario analysis, and the science-policy interface in sustainability research. His research has been instrumental in linking knowledge from the socio-economic, technological and natural sciences through the IMAGE model to understand the global climate change.

Over the past two decades, Detlef van Vuuren has played a pivotal role in shaping the global climate policy agenda. He is widely recognized for his work on the Shared Socioeconomic Pathways (SSPs) and Representative Concentration Pathways (RCPs)–two key frameworks used by the Intergovernmental Panel on Climate Change (IPCC) to assess future climate scenarios. His research has helped bridge the gap between science and policy by providing tools for understanding how different development trajectories and policy choices affect the environment, economy, and society.

The Spinoza Prize committee praised van Vuuren for his "scientific excellence, international leadership, and ability to connect complex models to real-world policy challenges." His interdisciplinary work has been instrumental in advancing knowledge on climate change mitigation, circular economy integration, and sustainable development.

The Spinoza Prize, often referred to as the "Dutch Nobel Prize," is awarded annually to researchers in the Netherlands who have achieved international acclaim in their field. The prize includes a €1.5 million grant, which recipients can use to further their research agenda.

With this recognition, Detlef van Vuuren joins the ranks of the most distinguished scientists in Dutch academia. His work continues to shape the global understanding of sustainability transformations and paves the way for science-based solutions to the world's most pressing challenges.

Check further on the prize at https://www.nwo.nl/en/spinoza-prize

Dialogue with stakeholders is a key component of the CIRCOMOD project. The primary users of the models and scenarios developed within the project are policymakers at national, EU, and international levels. This section highlights how we engage with these stakeholders to support and inform effective policy-making.

High-Level Dialogue on Integrating Circular Economy Modeling into Climate Neutrality Strategies in Europe

In September 2024, Brussels hosted a high-level event bringing together the CIRCOMOD and CircEUlar projects with the **European Environmental Agency (EEA)**, **European Commission (EC)**, **Organisation for Economic Cooperation and Development (OECD) national ministries and agencies** from selected countries. Experts and policymakers from across Europe convened to explore how circular economy (CE) modeling can support EU and national carbon neutrality strategies.

Key sessions focused on scenario planning and stakeholder engagement to refine strategies for a sustainable future. The **Empirical Research Session** opened the day, highlighting the role of circularity in reducing greenhouse gas emissions. Speakers included Peter Berrill (Leiden University) on CE's impact on emissions, Christian Klöckner (NTNU) on consumer behavior, and Charlie Wilson (Oxford University) on digitalization as a CE enabler. Additional presentations covered CE profiles (Pforzheim University) and consumer demand in mobility and housing (LMU Munich), sparking discussion on enablers of circularity and measurement indicators.

The second session addressed **Integrative Narratives for CE and Carbon Neutrality**, with Volker Krey (IIASA) emphasizing the power of narratives, Utrecht University presenting IRP scenarios, and Toon van Dyck (OECD) discussing policy outlooks on plastics.

In the **Modeling Circular Economy for Climate Mitigation** session, Reyer Gerlagh (Tilburg University) and Stefan Pauliuk (Freiburg University) presented models incorporating CE strategies. Case studies from the construction and appliance sectors were shared by Sofia Simoes (LNEG), Alessio Mastrucci, and Adriana Gomez Sanabria (IIASA), with Hanspeter Wieland (BOKU Vienna) showcasing economy-wide modeling approaches.

The final session, hosted by the EEA, featured a **Panel Discussion on the Science-Policy Interface**. Moderated by Jesus Alquezar Sabadie from DG Environment, the panel included insights from Oreane Edelenbosch (UU) and Detlef van Vuuren (PBL), Volker Krey (IIASA), Ana Lima (DTU), Marie Le Mouel (DG CLIMA), Tom Rommens (VITO), and Toon van Dyck (OECD). A central theme was the need for synthesis across circular economy scenarios and the development of common definitions, particularly in the context of the forthcoming Circular Economy Act from the European Commission. It revealed a pressing need to address data gaps, especially in material research, which remains less developed compared to energy or land use change data. The alignment between the CIRCOMOD, CircEUlar, and CO2nstruct consortia on how to describe and implement circularity strategies was a positive takeaway from the event.

The day concluded with enthusiastic feedback from participants. The high turnout and active engagement underscored the importance of this joint effort in advancing Europe's transition towards a circular economy and achieving climate goals.

Highlights from the CIRCOMOD stories:

Explore blog articles written by our colleagues, offering insights and reflections on their research findings, academic discussions, and real-world experiences.

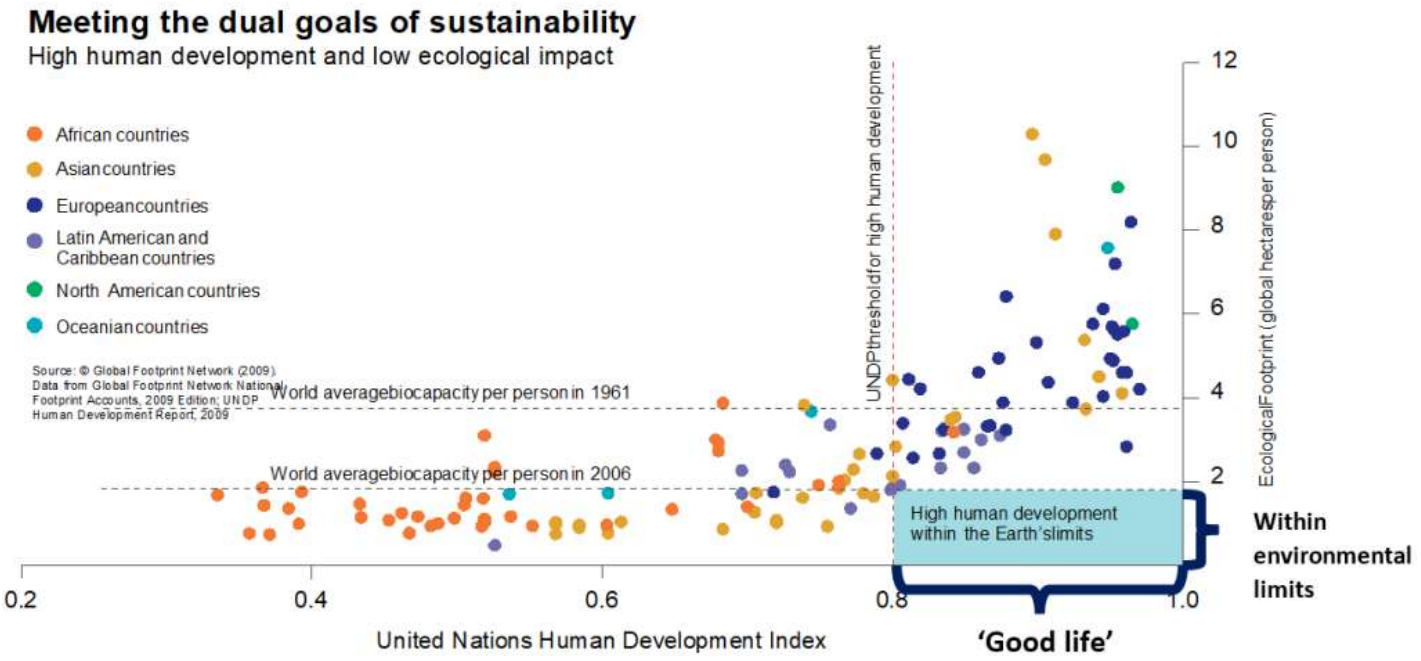
Circular Economy and Broad Prosperity: Can sustainability go hand-in-hand with well-being?

This blog article is prepared by ***Asel Doranova, Tilburg University***

In recent years, the concept of a circular economy (CE) has moved to the forefront of policy, academic, and business discussions. Touted as a transformative pathway to sustainability, Circular Economy challenges the traditional "take-make-dispose" model by promoting practices that keep resources in use for as long as possible – through reuse, repair, remanufacturing, and recycling. But as the circular economy gains traction, a key question arises: can it contribute not only to environmental goals but also to broad prosperity – the well-being of people and societies in the broadest sense?

This article explores whether circular economy strategies can align with the principles of broad prosperity, including their economic, social, and environmental impacts, and what that means for the present (here and now), other regions (elsewhere), and future generations (later).

Access the full article at: https://circomod.eu/circular-economy-and-broad-prosperity-can-sustainability-go-hand-in-hand-with-well-being/



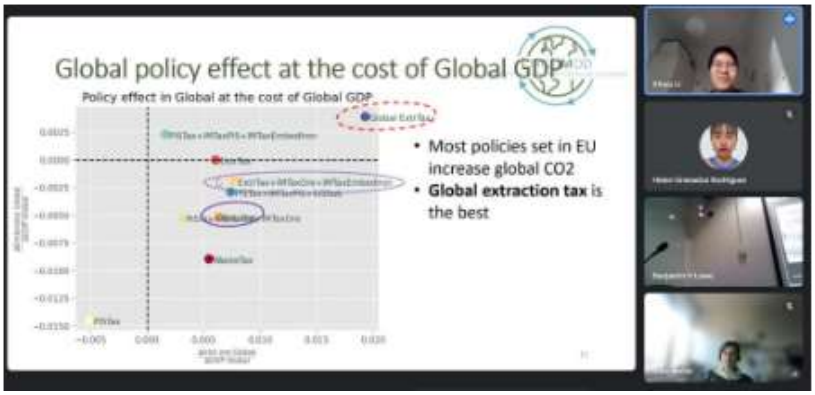
Exploring synergies with other projects

CIRCOMOD has been actively collaborating with various research initiatives to achieve mutually beneficial outcomes and enhance the research process. Here, we highlight some cooperation activities

Addressing Circular Economy and rebound effect

The CO2nstruct project (a Horizon Europe project – HEU) on September 2024 organized a workshop that focused on the Circular Economy and rebound effect. The Circomod team, a HEU project and sister project of CO2nstruct, contributed and presented their work. During the session, Julie Metta from Tilburg University (TiU) and Xinyu Li from the Netherlands Environmental Assessment Agency (PBL) presented their work on Work Package 5, which explores the use of Computable General Equilibrium (CGE) modeling to understand the effects of circular economy policies on emissions and resources consumption.

Their presentation examines the use of CGE model in assessing the effects of circular economy policies on climate mitigation efforts. By integrating material flows and economic data, WP5 provides insights into how CE policies could affect material consumption while triggering additional climate-related challenges. This workshop shows how European-funded projects like CO2nstruct and Circomod are collaborating and exchanging knowledge on the current research to address CE related challenges.



This first-of-its-kind global dataset of building material intensities

The construction materials that compose buildings – like concrete, steel, and wood – are associated with lots of environmental impacts, and have big circular potentials. We created 3072 material intensity ranges of construction materials in buildings, using over 900 datapoints from the literature and augmented by synthetic data for locations that have so far not been studied in detail. This first-of-its-kind dataset is the result of the first collaboration of CIRCOMOD with its sister project CIRCEULAR. The new fully open-access data will be used in these two research projects and beyond, for estimating historical and future material flows and emissions, assessing demolition waste and at-risk stocks, and evaluating urban mining potentials.

- The Scientific Data journal article describes the methods and the dataset.
- The data is available as a Zenodo repository.
- The code to create the data is available in a GitHub repository.

Do you want to learn more about this dataset, contact ***Tomer Fishman, Institute of Environmental Science (CML), Leiden University at*** *t.fishman@cml.leidenuniv.nl*

CircoMod at the UNFCCC COP29

Detlef van Vuuren (PBL), the scientific leader of the CIRCOMOD project, participated in several side events at **COP29 in Baku, Azerbaijan**, where he presented on climate scenarios aimed at reducing greenhouse gas emissions. As progress on climate mitigation continues to lag, meeting the goals of the Paris Agreement becomes increasingly challenging. Van Vuuren emphasized that combining **climate policy with circular economy strategies** could open up new opportunities to cut emissions. A central message of his presentations was the need to define an ambitious and coherent agenda for change.

Systemiq, one of CIRCOMOD's key partners, also made a strong contribution to COP29. **Janez Potočnik** delivered a virtual presentation at the German Pavilion during an event titled *"Plastic Pathways to INC-5: Ending Pollution and Reducing Climate Emissions."* His talk drew on findings from the **Global Resources Outlook 2024**, launched earlier this year, as well as Systemiq's ongoing work on **Ending Plastic Pollution by 2040** and the **Plastic Treaty Futures** initiative.

Julia Okatz (Systemiq) presented at the BENELUX-EIB Pavilion during the event *"We Must Talk About Resources – Circular Economy Strategies to Mitigate Climate Change."* Her presentation also featured key insights from the Global Resources Outlook 2024. In addition, Julia moderated a panel discussion on the **Future of Urban Mobility** at **the UAE Pavilion, further** highlighting the role of circular strategies in building low-carbon, resource-efficient cities.

Explore our latest publications

Unaddressed non-energy use in the chemical industry can undermine fossil fuels phase-out

Zanon-Zotin, M., Baptista, L.B., Draeger, R. et al. *Unaddressed non-energy use in the chemical industry can undermine fossil fuels phase-out.* Nature Communication 15, 8050 (2024).

Full paper access: https://doi.org/10.1038/s41467-024-52434-y

This study explores the future role of fossil fuels for non-energy purposes in climate-stringent scenarios with restrictions on alternative feedstock availability, focusing on the primary chemicals sector. Using a global integrated assessment model with detailed refining and primary chemicals sectors, findings across various scenarios reveal that up to 62% of total feedstock use in the chemical sector could be provided by alternative sources by 2050. This would require significant scale-up in biomass utilisation and carbon capture technologies. Annual CO2 emissions from the chemical sector could be reduced to as low as −1Gt CO2 by the same year if carbon storage in non-recycled and non-incinerated bioplastics is accounted for.

Reducing sectoral hard-to-abate emissions to limit reliance on carbon dioxide removal

Edelenbosch, O.Y., Hof, A.F., van den Berg, M. Maarten van den Berg, Harmen Sytze de Boer, Hsing-Hsuan Chen, Vassilis Daioglou, Mark M. Dekker, Jonathan C. Doelman, Michel G. J. den Elzen, Mathijs Harmsen, Stratos Mikropoulos, Mariësse A. E. van Sluisveld, Elke Stehfest, Isabela S. Tagomori, Willem-Jan van Zeist , Detlef P. van Vuuren. *Reducing sectoral hard-to-abate emissions to limit reliance on carbon dioxide removal.* Nature Climate Change 14, 715–722 (2024).

Full paper access: https://doi.org/10.1038/s41558-024-02025-y

This study using scenarios consistent with the 1.5 °C target, shows that demand and technological interventions can substantially lower emission levels in four hard-to-abate sectors of industry, agriculture, buildings and transport, and reduce reliance on the use of bioenergy with carbon capture and storage. Specifically, demand measures and technology-oriented measures could limit peak annual bioenergy with carbon capture and storage use to 0.5–2.2 GtCO2e per year and 1.9–7.0 GtCO2e per year, respectively, compared with 10.3 GtCO2e per year in the default 1.5 °C scenario. Dietary change plays a critical role in the demand measures given its large share in residual agricultural emissions.

Linking hypothetical extraction, the accumulation of production factors, and the addition of value

Hertwich, E. G., Koslowski, M., & Rasul, K. (2024). Linking hypothetical extraction, the accumulation of production factors, and the addition of value. *Journal of Industrial Ecology*, 28, 736–750.

Full paper access: https://doi.org/10.1111/jiec.13522

In industrial ecology, approaches have been developed to analyze the contribution of specific sectors to environmental impacts within supply chains. In economics, a range of methods addresses the forward linkage (use of output) and backward linkage (dependency on inputs) of sectors, and the analysis of key sectors. This article offers a formal investigation of the relationship between these. It shows that both the analysis of supply chain impacts and of intersectoral linkages can be seen as special cases of a more general hypothetical extraction method (HEM). This method can be applied to study the environmental footprints of companies or intermediate products, the contribution of certain inputs to sectors, or the potential impact of disruptions of supply chains on producers and consumers. In this article, the price model for HEM is introduced to identify the contribution of the extracted (target) sectors to the price or unit footprint of a commodity.

Curious about the CIRCOMOD project?

Learn about our work and approaches we are deploying in the CIRCOMOD project at https://circomod.eu/about-us/our-work/

Tests different visualization options for circular economy scenarios by visiting the CIRCOMOD Data Hub at https://circomod.eu/circomod-data-hub/

Read blog articles from CIRCOMOD team members at https://circomod.eu/category/blog/

Explore our ever increasing library of scientific publications: https://circomod.eu/category/library/

Please check all deliverables of the project at https://circomod.eu/circomod-deliverables/

If you want to inquire more information about the project, explore http://circomod.eu/

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