The twentieth century was an age of unprecedented growth in the use of natural resources and materials. Global raw material use rose at about twice the rate of population growth.

The rate of growth in material use was fastest in rapidly developing economies. Advanced economies managed to partially decouple domestic resource consumption from GDP growth, but their footprint on global materials use is still very large. Much stronger decoupling is required to counteract the resource demands of a growing world population and the pursuit of higher material living standards in many regions.
RE-CIRCLE aims to identify and quantify the impact of policies which increase resource efficiency and further the transition to a circular economy.

The aim is to provide policy guidance to a range of stakeholders in OECD member countries and emerging market economies through quantitative and qualitative analysis. Improving resource efficiency and furthering the transition to a circular economy are important elements of green growth.

Increasingly, these objectives are also recognised as key components of broader environmental and economic policy, as illustrated by recent initiatives at the G7 and G20.

The project is a successor to CIRCLE, an OECD project quantifying the feedbacks from environmental challenges on long-term economic growth.
The RE-CIRCLE project is structured around two work packages:

1. The first workstream uses qualitative analysis on selected topics to guide policies to further the transition to the circular economy.

2. The second workstream uses global environment-economy modelling to project impacts of resource use and the effect of policy interventions.
1. Qualitative analysis:

The first work package on qualitative policy guidance encompasses a number of activities on priority areas.

Plastics are given particular attention, as they are one of the major material waste streams where circularity is less developed and leakage into the environment is putting marine eco-systems at risk.

The planned work also covers specific economic policy instruments, the potential influence of digitalisation, assessments of particular material resources and food, the role and effects of circular business models on the environment, and resource efficiency in global value chains.

2. Modelling analysis:

The second work package builds upon OECD’s expertise in environment-economy modelling. The work investigates the interlinkages between materials use and economic activity, including the use of virgin and secondary materials in economic production.

Modelling tools are used to examine plausible long-term trends in global materials use and assess the macroeconomic implications of policies to stimulate resource efficiency and the transition to a circular economy.

These core assessments are complemented by more detailed analysis, including of the labour market and distributional consequences, resulting changes in international trade and links with climate change.
Qualitative analysis: key issues addressed

Policy instruments:
• How can economic policy instruments be designed to support the transition towards better resource efficiency and what are the good practices that can be identified from recent experience?

Businesses:
• What are the key types of new business models that are of relevance to the circular economy and resource productivity and the environment more broadly?
• What are the policy measures that could help to maximise the resource productivity improvements that these business models may provide?
• How can governments support value chain management for resource efficiency?

Digitalisation:
• What are the key circular economy areas where digitalisation is expected to provide significant opportunities or challenges and what are the policies that can support the exploitation of the opportunities and the management of the challenges?
Plastics:
- What are the policy measures that could help to strengthen markets for recycled plastics?
- What are the policy measures that could help to address the issue of micro plastics?

Waste prevention and disposal:
- How can waste prevention policies be assessed and strengthened?
- Where are the opportunities for better aligning waste and chemicals management policies?
Qualitative analysis: key areas of work

The qualitative analysis workstream aims to develop policy guidance in a number of areas that are key to circular economy transition.

Plastics:

The share of plastic in various waste streams is rapidly increasing leading to waste management issues with plastic debris accumulating in landfills, or being discarded in the natural environment and entering the food chain.

On the other hand, plastic waste presents opportunities for material and energy recovery. Hence, there is significant scope to improve the way plastics are managed in our economies. OECD work in this area seeks to identify the policies that can reduce plastics waste and increase recycling of this ubiquitous material.

Digitalisation:

Digitalisation holds many promises, but it is also potentially highly disruptive. For the circular economy the opportunities and challenges that are presented by digitalisation are likely to be equally important. For instance, the widespread availability of low cost sensors and data management facilities could significantly support the implementation of pay-as-you-throw waste collection systems that bill households based on the amount of waste that they generate.

OECD work in this area seeks to better understand where digitalisation can be expected to provide significant opportunities or challenges for circularity and what some of the related policies interventions may be.
Box 1. **New business models for a circular economy transition**

A range of new business models, such as sharing and service based models, are emerging and some of them are scaling-up very quickly. While some of these models seem to hold opportunities for resource productivity and the environment, their potential impacts are insufficiently researched. Even less is known about the policy measures that governments can use to encourage the business models that appear to be virtuous from the perspective of resource efficiency.

Work focuses on identifying the different types of business models that are supportive of a circular economy approach, their scalability, the economic sectors that are most likely to implement them and the public policy measures that are available to governments to support a transition towards these models. This work builds on and links into ongoing efforts on new business models in other parts of OECD, particularly in the Science Technology and Innovation Directorate, as well as in the Directorate for Financial and Enterprise Affairs.

**Policy instruments:**

It is widely accepted that the transition towards more resource efficient economies will require the increased use of economic instruments to achieve policy objectives at least cost.

Instruments such as extended producer responsibility, where the responsibility of producers for the goods they place on the market is extended to end-of-life management, are now in widespread use across the OECD membership, but questions remain about their most effective design. OECD works to develop further policy guidance on this and other market-based instruments.

**Circular business models:**

Businesses will play a central role in the transition towards a more resource efficient economy by adapting their business models and value chains, but the pace and scale of these changes will depend on the extent to which an enabling policy framework can be set in place.

In this context, the OECD works to better understand the opportunities and challenges that this entails for enterprises and policy makers (see Box 1).
Modelling analysis: key issues addressed

**Materials use:**
- What are the main drivers of future materials use?
- To what extent will socioeconomic trends that drive economic growth also lead to an increase in global materials use?

**Structural changes:**
- What are the main changes in the economy that fit with a transition to a green, circular economy?

**Policy measures:**
- Which policy measures are most effective and efficient in achieving the various policy goals associated with circular economy and resource efficiency?
- To what extent can circular economy and resource efficiency enabling policies boost economic growth?
- How can a full policy package be designed to smoothen the transition to a green, circular economy and simultaneously boost economic growth, reduce environmental pressures and stimulate employment?
This first activity sets the stage by assessing the state of the art in the literature on the economic consequences of a transition to a circular economy. There is an emerging body of work that employs ex ante quantitative models to address this question. Ex ante because many aspects of a circular economy transition are “out of sample”; there is no historical experience that can be drawn upon for empirical analysis. Quantitative because any such transition is likely to be highly complex; it will affect many types of resources and materials, involve multiple sectors and countries, with spill-over and interaction effects between each, and take place in parallel with other emerging trends such as digitalisation and automation. The primary aim of this activity is to critically review the existing assessments in order to provide a set of recommendations on how future work can better assess the efficiency and effectiveness of circular economy enabling policies.

The likely economic consequences of a circular economy transition, when assessed in an ex ante context, depend largely on:

- how such a transition is defined,
- the structure and assumptions of the model that is used to assess it,
- the policies that are implemented to enable it.

The review paper resulting from this activity addresses each of these issues in three main sections. The first section discusses existing definitions of the circular economy, and what is meant by a “transition to a circular economy”. The second section describes existing modelling tools in terms of four key characteristics: geographic coverage, sectoral coverage, linkages with physical material flows, and the mechanisms used to simulate efficiency improvements and different types of substitution. The third section discusses the types of policies that have been implemented in existing studies, and summarises the main results in terms of macroeconomic impacts. The final section provides recommendations for future modelling assessments.
The modelling analysis workstream presents detailed projections of sectoral economic activity and resource use for the world and specific major economies.

The RE-CIRCLE modelling analysis is comprised of two components:

1. An Outlook covering the economic drivers of materials use to 2060 is used to make baseline projections of materials use in the absence of new dedicated policies.

2. The economic, resource and environmental impacts of a broad set of policies that aim at improving resource efficiency and enable the transition to a circular economy are studied.

The work in this activity develops OECD modelling tools by linking physical resource flows (fossil fuels, materials) to specific economic activities and - to the extent possible - integrating essential elements of a circular economy, such as recycling of waste products as secondary inputs into production, and the use of secondary inputs as substitute for primary resource use.

Multi-sectoral Computable General Equilibrium (CGE) models such as the OECD's ENV-Linkages are an appropriate tool for quantifying the macroeconomic consequences of the transformation of the economy needed to improve resource efficiency and transition to a circular economy.

Macroeconomic analysis can complement existing sectoral assessments of resource efficiency which can have more detail on specific resource requirements but lack linkages to the rest of the economy.

The ENV-Linkages model encompasses all major economies in the world, as well as several regional groups, allowing for a global analysis.

This global dimension ensures that all quantitative analyses are directly relevant for both OECD countries and key emerging economies, including China, India, Indonesia, South-Africa and Brazil.
The multi-sectoral nature of the model also allows for detailed insights into the consequences of policy reform on various sectors, and provides key indicators of the consequences for main policy objectives, including employment consequences. This provides countries with internally consistent, and globally connected scenarios of economies around the globe as they evolve over time.

Box 3. **Outlook to 2060: GDP and material use**

Assumptions on future linkages between economic activity and materials use affect the challenge for policy making: when recent trends are continued, materials use will grow more rapidly than GDP, implying a huge demand for materials. When societies manage to gradually decouple materials use trends from economic activity, then in the longer term total materials use may decline. But the most plausible trend given current policies is in between: some relative decoupling can be achieved through improved efficiency but global materials use will likely continue to increase.
Circularity of the economy, and increases in resource efficiency, can be achieved by a multitude of different policy instruments.

Each policy instrument has a particular way of affecting the economy, and have specific effects on key indicators such as total materials use and recycling rates.

Circular economy and resource efficiency enabling policies are therefore likely going to result in structural changes in the economy, leading to the decline of certain sectors and the rise of others, with a reallocation of capital and labour along the way. To date, relatively little analytical work that examines these structural changes and the effect on the economy as a whole has been carried out to date.

Wider transformations in the economy, not least the transition to a circular economy, transcend the sectoral level and have implications for the entirety of the economy, and thus on all segments of the labour market.

Therefore, a more detailed analysis of the labour market consequences can shed light on employment gains and major areas of job losses that result from the policies investigated in this project.

Similarly, international trade patterns will be significantly affected, and the competitiveness of sectors in different countries will be influenced by the different policy instruments. This warrants a detailed investigation of the international trade consequences of resource efficiency and a circular economy.

Finally, the policies to improve resource efficiency and enable circularity do not operate in a policy vacuum. Other green growth and climate change policies will affect firms and households as well. Thus, it is interesting to investigate where trade-offs and synergies between a circular economy transition and a low-carbon transition are strongest.
More information

The RE-CIRCLE project is led by the OECD Environment Directorate. The project also draws on the expertise of the OECD governments.

For more information on current RE-CIRCLE workstreams and prior work on resource use and modelling, please visit:

- oe.cd/recircle
- oecd.org/environment/modelling
- oecd.org/environment/waste/

For more details on...

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RE-CIRCLE is an OECD project providing policy guidance on resource efficiency and the transition to a circular economy.

The aim of the RE-CIRCLE project is to identify and quantify the impact of policies which increase resource efficiency and further the transition to a circular economy.

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