PBL Netherlands Environmental Assessment Agency

POSSIBLE OBJECTIVES FOR A CIRCULAR ECONOMY

Summary of the Dutch policy brief 'Mogelijke doelen voor een Circulaire Economie'

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This report was produced in the framework of the Work Programme on Monitoring and Directing the Circular Economy, 2019–2023. The Work Programme is a collaborative effort of several knowledge institutes under the direction of PBL Netherlands Environmental Assessment Agency. The Dutch Government is pursuing to achieve a fully circular economy by 2050. The aim of the Work Programme is to monitor and assess the charted path towards 2050 and to provide the government with the knowledge required to design and adjust policies. Further information on the Work Programme on Monitoring and Directing the Circular Economy can be found at https://www.pbl.nl/monitoring-circulaire-economie.

Monitoring en Sturing Circulaire Economie

Summary

This is a summary of the Dutch policy brief in which PBL identifies the possible objectives of a circular economy — a study at the request of the Dutch Ministry of Infrastructure and Water Management. It was conducted in cooperation with Statistics Netherlands (CBS), the Institute of Environmental Sciences (CML), Netherlands Organisation for Applied Scientific Research (TNO), the National Institute for Public Health and the Environment (RIVM) and Rijkswaterstaat (RWS, the government service for roads and waterways). The study is intended to support a process to work out the details of the general objectives of a circular economy for 2030 and 2050, carried out by the ministry in consultation with stakeholders.

Changes in the way raw materials are used may contribute substantially to solving various major social issues, such as the impact of climate change, biodiversity loss, pollution of air, water and soil, and supply risks related to raw materials. The study analyses which raw material flows and product groups are most relevant, in this respect. In doing so, PBL builds on an earlier PBL publication about the objective of achieving a circular economy by 2030 (*Doelstelling circulaire economie 2030. Operationalisering, concretisering en reflectie,* Kishna et al., 2019). This policy brief outlines the next steps towards a framework for setting more concrete targets for a circular economy.

A circular economy is about applying resources as efficiently as possible

Many natural and environmental problems can be traced back to the wasteful use of raw materials. This leads to the emission of pollutants into the air, water and soil, with undesirable consequences such as climate change, loss of biodiversity, and plastic soup in the oceans. Moreover, the use of raw materials around the world is increasing and the interdependencies within production chains increase the supply risks for these raw materials.

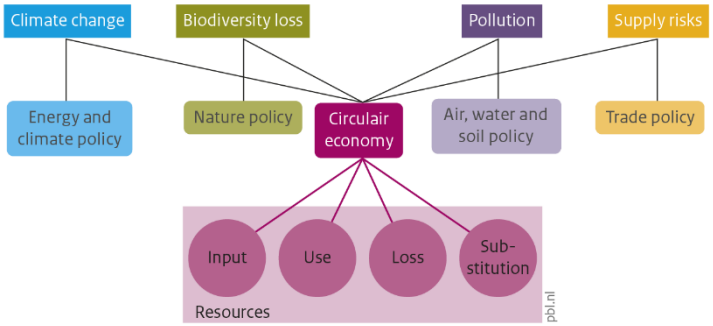
A circular economy is aimed at a radically more efficient use of resources. In principle, this can be done in four ways:

1. Use fewer resources (*narrowing the loop*) by sharing or foregoing the use of certain products, and by more efficient manufacturing processes;
2. Use products and product parts for longer and more exhaustively (*slowing the loop*), by reusing and repairing them; this slows down the demand for new raw materials;
3. Recycle materials *(closing the loop)*, reducing the amount of material that is incinerated or landfilled and, thus, decreasing the demand for new raw materials;
4. *Substitute* finite resources for renewable resources (e.g. bioresources) or alternative primary resources that exert less pressure on the environment.

These four categories characterise the circular economy and are, in fact, a simplified representation of the more comprehensive schemes of so-called R-strategies, as found in previous publications, including those by PBL (e.g. Hanemaaijer et al., 2021; Potting et al., 2018). By applying these strategies to the use of resources, a circular economy can, for example, contribute to combating climate change and environmental pollution and to reducing biodiversity loss and raw material supply risks (see Figure 1).

Figure 1

Positioning the circular economy in relation to social challenges and other policy themes



Source: PBL

Unlike the climate change-related challenge — with reduction in greenhouse gas emissions as its main goal — achieving a circular economy has no single overarching or generic goal (Kishna et al., 2019). Instead, it requires a set of goals that address the input, use and loss of raw materials, as well as the effects of raw material use. In doing so, it makes sense to distinguish between goals that focus on the more efficient use of raw materials (circularity targets) and those that focus on the environmental and socio-economic effects of raw material use (impact targets).

After all, circularity is first and foremost about preventing the waste of raw materials and promoting their efficient use. Subsequently, more insight is needed into how more circular production and consumption would contribute to achieving the desired effects. In other words, in the way that either less or more efficient use of raw materials would contribute to solving major societal issues.

Targets that promote the circularity of resources

Circularity targets can be set for the input, use and loss of raw materials. By designing products and parts to be more repairable, and by sharing products more often, reusing them and then recycling them at a high level, raw material use becomes more efficient and, in principle, fewer new raw materials will be needed. Circularity targets guide the extent to which the various R-strategies are used.

When formulating circularity targets, they can be built on existing policy targets of the Dutch Government. For example, there is already a general goal to halve the amount of primary abiotic raw materials used (minerals, metals and fossil fuels) by 2030, there are various targets for recycling, and the goal is to halve the outflow of raw materials from the system (i.e. towards waste incineration and landfill) between 2013 and 2023. There are no targets yet for product reuse and other strategies aimed to extend the life of products and components, nor for the use of biobased raw materials.

These goals are mainly about limiting the quantities of raw materials used. However, the value of raw materials (or value retention) is also relevant. For example, the economic value of a second-hand laptop is much higher than the sum of its individual components, and the individual components, in turn, are worth considerably more than the secondary (i.e. recovered) raw

materials that could be salvaged from recycling them. Concrete targets that operationalise value retention appear to be particularly useful on product group level.

We therefore arrived at the following starting points for targets:

1. resource input;
2. resource use;
3. resource loss;
4. the value of resources and products.

Because of the focus of current policy goals on the volume of raw material flows, the environmental effects of raw material use often remain out of the picture. Think of the emissions to air, water and soil during the production and use of steel, plastics and artificial fertilisers, for example. The same applies to socio-economic effects, such as the supply risks related to raw materials. This is why, when choosing targets for circular economy policy, it makes sense to also look at the effects of the use of natural resources, materials and products.

Relevance differs per resource type and product group

The relevance of raw materials and product groups depends on the perspective chosen. If the starting point is the amounts of raw materials used, then the most relevant raw material flows and product groups differs from when, for example, the environmental impact of this use is considered:

- In terms of quantities, fossil resources and sand and gravel make up the largest flows of resources and materials in the Dutch economy. Sand and gravel are used in large quantities, but the environmental impact of these raw materials and the materials made from them is limited, compared to for example steel and animal products.
- The largest environmental impacts of Dutch consumption are related particularly to the use of fossil fuels, to the construction of housing and infrastructure (mainly due to the use of wood, iron and steel and, to a lesser extent, concrete) and to food production (mainly animal products). Furthermore, also significant are the environmental impacts of consumer goods, such as furniture, electrical appliances and clothing.
- Only small quantities of critical materials (i.e. those of economic importance and that have supply risks, such as nickel, cobalt and lithium) are used in production processes, but they are crucial for the competitiveness of Dutch industry. Products that depend on these critical materials include machinery, electronics, cars and renewable energy technologies, such as solar panels.

Impact targets for climate, biodiversity, pollution and supply risks

The analysis in this policy brief shows that the use of raw materials has a wide range of environmental impacts, with strong differences in the relevance of raw material flows and product groups per type of effect. In theory, targets can be formulated for each impact, which can be measured using footprints. However, this would lead to a rather extensive and complex set of targets.

The challenge is to arrive at a limited and thus manageable set of targets, which will enable managing the transition towards a circular economy, in a broad sense. The search for the environmental and socio-economic effects that a circular economy should achieve at the very least, and for which it makes sense to formulate main targets, were derived from discussions with policymakers and representatives from the business community. This resulted in four desired main effects. These effects are shown in Figure 1 and can be expressed as:

1. countering climate change: climate-neutral by 2050;
2. reducing biodiversity loss: remaining within the ecological carrying capacity of the Earth;
3. counterbalancing the pollution of air, water and soil: the *Zero Pollution Action Plan 2050* of the European Commission;
4. reducing the supply risks for resources.

Although this does not mean that other environmental and socio-economic effects are not relevant, it is not necessary to set separate targets for all possible effects. Certain environmental and socio-economic effects can be monitored without any related targets having been set. In a number of cases, specific preconditions, such as working conditions, are needed for the use of raw materials. A more circular production does not automatically mean that working conditions will improve, which is why setting a target for working conditions does not seem very useful for a circular economy. However, it would be valuable to include working conditions in the product chain as a precondition in the transition towards a circular economy.

Focus particularly on product groups when managing impact targets

The environmental and socio-economic impacts of raw material use seem to be most effectively addressed at product group level (e.g. meat, electronics and textiles). By looking at a product group rather than an individual resource or material, it is possible to gain insight into and control over its use and the environmental effects throughout the production chain and product life cycle. Moreover, impact targets for product groups are often more in line with the possibilities available to the parties involved in the chain to change how they use the resources or to reduce the related environmental impact.

While the nature and extent of the impacts of raw material use can vary considerably between product groups, which therefore requires differentiation between impact targets, the challenge is at the same time to set relatively simple targets. Doing so in a way that is manageable and communicable for the government is to aim for a substantial reduction or halving of the environmental impact at product group level. The advantage of such more generic effect targets is that this offers scope for different emphases per product group. Such a target at product group level is clear and simple to communicate, and also does justice to the complexity and diversity of a circular economy.

Stimulating innovation calls for a combination of impact and performance targets

In addition to long-term targets on circularity and environmental and socio-economic effects, a guiding framework for the circular economy may also contain performance targets that contribute to the realisation of the intended effects. Performance targets indicate how government and businesses are expected to contribute to achieving those effects. Examples of such targets include extending producer responsibility in the mattresses and textiles manufacturing industry (a performance target aimed at a policy instrument) or a target for chemical recycling of a certain number of kilotonnes of plastic waste (a performance target aimed at a technological solution).

National performance targets may contribute to the acceleration of innovation, also on aspects for which circularity or impact targets are not or not yet feasible, such as for extending the product life cycle (e.g. a performance target for doubling the warranty period of products). Performance targets are also often in line with the ambitions and actions included in the five Dutch transition agendas (for the themes of Biomass and food, Plastics, Manufacturing, Construction, and Consumer goods)

and the Circular Economy Implementation Programme, and thus offer opportunities for linking these actions to national targets.

Provide learning opportunities and a flexible process of change

The transition towards a circular economy is complex and still in its early stages, which means that much is still unknown. There is, for example, still no comprehensive overview of the possibilities for reducing the use of natural resources and limiting the negative effects of raw material use. Because of these gaps in knowledge, it is advisable to design the guiding framework in a flexible way, with room for reflection and learning. Flexibility is about being able to adjust both the long-term goals and the road towards them. This leaves room for experimentation and for learning from experience. The challenge here is to arrive at predictable targets that provide sufficient certainty for entrepreneurs and investors.

This can be done, in advance, by indicating that flexibility means targets can be adjusted, for example, following new scientific insights, experiences of front runners and changes in EU policy. In this way, effect requirements could be set for product groups on the basis of the best available technology (BAT), and to agree in advance that, within a few years, new possibilities will become the standard or a target, and to update these effect requirements, over time. By focusing on the targets rather than on the means to achieve them, such an approach would provide a permanent stimulus for innovation without excessive risks of any perverse effects resulting from means regulations.

Start with a few relevant product groups per transition theme

Because many different raw materials are used in the Dutch economy and even more products are manufactured and used, it makes sense to start the policy process by setting circular economy targets for a few relevant product groups per transition theme. A first important question relates to the appropriate aggregation level. Is it about all electrical appliances, for example, or does it make sense to distinguish between household appliances and other electrical goods and electronics? Agreements can then be made per product group between government authorities and stakeholders about the targets and by when these should be achieved.

Targets may concern the desired reduction in environmental pressure — for example, halving the environmental pressure in the chain by a certain year, or describing ways of achieving a target, such as extending the warranty period for products. This also includes agreements on measuring progress and evaluating the results achieved. To gain insight into the possibilities of reducing the environmental pressure for a product group — via the R-strategies — an inventory of the various options would be needed: what are the expected effects and the costs of, for instance, repairing and recycling products?

The Integral Circular Economy Report (ICER, see Hanemaaijer et al., 2021) provides an overall impression of performance and effects. This biennial series is to report on the progress of the transition towards a circular economy in the Netherlands. Every two years, it looks at raw material use and its effects, as well as at the actions taken by the government and stakeholders towards achieving a circular economy. In future editions of the ICER series, it is expected that the general progress made in relevant product groups can also be included.

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