

A circular economy allows a significant reduction in the consumption of natural resources



Finns use up to ten times more raw materials in their consumption than a sustainable level measured in proportion to the population would allow. Consequently, immediate action is needed to transition to a circular economy in Finland.

The current regulatory framework supports the extensive use of raw materials. The system needs to be comprehensively assessed and redesigned to meet the needs of a circular economy.

Circular economy solutions are worth promoting especially in industries which use large amounts of natural resources. These include, for example, construction and the process industry as well as the food chain from production to the utilisation of surplus food.

Legislation could be used to promote a longer life span for products, for example, by requiring longer warranty periods, reparability, and the possibility of making upgrades. We also need to ascertain which fields could make better use of recycled raw materials than they do now.

Further information is needed on matters such as material flows and material stocks, the ecological, economic, and social effects of a circular economy, as well as the design of products and services to reduce the use of natural resources.

Quantitative goals must be set for reducing the use of virgin raw materials.



A shift to a circular economy is needed

A circular economy can help in securing an adequate supply of natural resources for coming generations. This involves, for example, critical raw materials such as rare metals, which are needed for the batteries of electric cars and for other solutions for a low-carbon society. In addition to the recycling of substances and materials, a circular economy means various services of a sharing economy aimed at reducing the need for personal ownership of goods.

A circular economy creates business activity and can significantly benefit the economy^{1,2}. When shifting to a circular economy, it is important to take the social consequences of the transition into consideration. For example, the safety of recycled raw materials and of the processes involved need to be established³ both in Finland and worldwide.

According to the Programme of Prime Minister Antti Rinne's Government 2019 a horizontal, strategic circular economy programme will be drafted for Finland in the current government term. Already in 2016, Finnish road map to a circular economy was drafted under the direction of the Finnish Innovation Fund (Sitra). It was updated in 2019. Nevertheless, the consumption of raw materials in Finland continues to be as much as ten times higher than a sustainable level would allow. Per capita consumption in 2015 was 29 tons⁴, while 3–8 tons has been estimated as a sustainable level^{5,6}.

Finland is one of the most material-intensive countries in Europe⁷. A transition to a circular economy would be spurred by measures such as factoring environmental harm into prices, making investments that support a circular economy, and re-evaluating regulations^{2,8,9,10}.

Quantitative goals are needed

Circular economy promotion is beneficial especially in industries that use large amounts of natural resources both in Finland and on a global level. These include activities such as construction and the process industry as well as the food chain all the way from production to the utilisation of

surplus food. It would also be important to bring industries which use rare raw materials, such as the electrical, electronics, and battery industries, into the circular economy.

Resource efficiency has already been increased in Finland in the process industry creating, for example, industrial symbioses in which one company utilises the side streams of another in its production. A plan has been drafted for the recycling of agricultural nutrients¹¹.

Comprehensive action plans for a circular economy are needed in all crucial fields. Ambitious quantitative goals need to be set for reducing the use of virgin raw materials and for increasing the use of recycled raw materials. For example, in The Netherlands a goal has been set for halving the use of virgin raw materials, such as minerals, metals, and fossil fuels by the year 2030¹².

Success in achieving the goals could be measured by, for example, the ratio of raw material consumption to GDP, the proportion of circular-based economy of the entire national economy¹³, and the proportion of recycled raw materials among all raw materials used in industries that use large amounts of natural resources and critical natural resources.

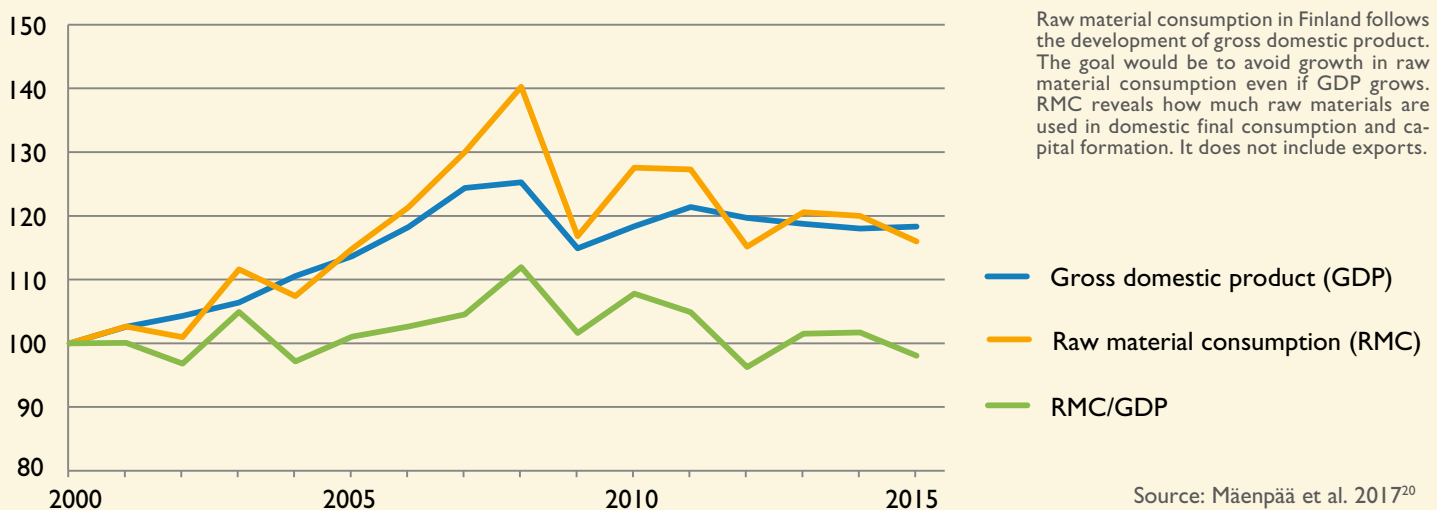
Voluntary agreements and legislative change

Moving to a circular economy requires economic and legislative reform. Prerequisites for a circular economy need to be created through policymaking, and old structures need to be replaced by new ones^{14,15}. Detrimental subsidies must be reduced, and the most harmful procedures must be banned.

For example, a deposit fee system¹⁶ based on voluntary agreements could be established for key material flows and product groups, such as electronics industry products. Legislation could be used to promote a longer operational life for products, for example by requiring longer warranty periods, as well as introducing quality standards to make the products easier to repair and update. Investigation is also needed on which sectors would need to require greater

RAW MATERIAL CONSUMPTION AND ECONOMIC DEVELOPMENT IN FINLAND

Volume index, year 2000=100



Source: Mäenpää et al. 2017²⁰

MATERIAL FLOWS IN FINLAND 2015

Promotion of a circular economy is worthwhile especially in industries which use large amounts of natural resources. Since 2015 total use of natural resources has grown to some degree.

Domestic natural resources 170 Mt

Soil materials 89 Mt

Roundwood 34 Mt

Non-metallic minerals 18 Mt

Metal ores 16 Mt

Crops and wild catch 9 Mt

Fossil fuels (peat) 3 Mt

Raw material flows in imports 173 Mt

Metal ores 78 Mt

Fossil fuels 52 Mt

Non-metallic minerals 23 Mt

Roundwood 9 Mt

Crops and wild catch 8 Mt

Soil materials 2 Mt

Final use 158 Mt

Households and domestic consumption 86 Mt

Construction, machinery and equipment, and other investments 72 Mt

Export 185 Mt

INDUSTRIES USING THE MOST DOMESTIC NATURAL RESOURCES

- Construction
- Manufacture of pulp, paper, paperboard, and cardboard
- Manufacture of non-ferrous metals

INDUSTRIES USING THE GREATEST AMOUNTS OF RAW MATERIAL FLOWS FROM IMPORTS

- Manufacture of non-ferrous metals
- Manufacture of iron and steel
- Manufacture of refined petroleum products
- Manufacture of pulp, paper, paperboard, and cardboard
- Manufacture of machinery and equipment
- Construction of residential and non-residential buildings
- Manufacture of electrical and electronic products
- Manufacture of chemicals
- Manufacture of fabricated metal products

Source: Nissinen & Savolainen 2019⁴
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use of recycled materials. Identification and separation techniques should be developed for the entire life cycles of materials and chemicals. When amending the Land Use and Building Act, promoting a circular economy must be included at all levels of planning.

Transition to a circular economy requires extensive structural changes. This is why it is important to assess the effectiveness, economic efficiency, and social aspects of various policy instruments as a whole. Possible legislative impediments to a circular economy must be lifted¹⁷.

Public procurers can serve as circular economy pioneers and developers. They can also offer companies possibilities to test solutions that promote a circular economy in areas such as construction and transport. Public administration should make stronger commitments to procurements that advance a circular economy than they do now¹⁸.

Finland can have a wider impact

In 2015 the European Commission gave its approval to a European Circular Economy Action Plan. The plan was augmented in 2018 by introducing a package of measures covering areas such as plastics, critical raw materials, and chemicals. The EU is monitoring progress toward a circular economy through an extensive set of indicators measuring things such as the use of recycled material, the development of waste management, and circular economy innovations. In addition, the EU supports numerous research, development, and innovation

projects in the Horizon 2020 programme, for example.

Finland has knowledge and skills in circular economy technology and management, which could also be utilised internationally. Finland could produce useful circular economy solutions especially in construction and in the recycling of agricultural nutrients and textiles. Finland also has know-how in matters related to waste and water management¹⁹. Later Finland could be a trailblazer in innovations for recycling critical raw materials such as rare metals.

A circular economy must be based on researched knowledge

- Shifting to a circular economy requires comprehensive change in the operating models and systems of society, in other words, a systemic change. More information is needed on what kinds of measures aimed at promoting a circular economy would bring the greatest benefit for the environment and for human well-being. The material flows within and between different branches of industry, and the quantity and quality of material reserves need to be assessed.
- Shifting to a circular economy requires changes in business models. It is important to study how different business models, political measures, and technologies link up with each other. Information is also needed on how to manage global product chains and service structures, such as repair services, that extend the life spans of products.
- Environmentally oriented product design is a foundation for a secure and sustainable circular economy. When developing new materials, products, and services, the full environmental and health effects of their life cycles need to be considered. It is also important to ascertain how larger amounts of recycled materials could be used and side streams utilised.
- A circular economy is linked with the community structure and land use. Research is needed on the effect that the use of areas has on sharing economy solutions, for example. The impact of a circular economy on biodiversity needs to be assessed.
- A circular economy has an extensive impact on society. Consequently, the cultural and social effects of a circular economy also need to be assessed. For example, research is needed on how the benefits of a circular economy can be shared fairly both in Finland and globally.
- High-quality and open data reserves are needed for the management of a circular economy. Better information is needed on construction materials and textiles, for example. In addition, research is needed into what kind of information consumers need on the recycled raw materials used in the manufacture of products, as well as the durability, serviceability, and reparability of the products.



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Further information:

SYKE: Towards the circular economy www.syke.fi/circulareconomy
 Sitra: The critical move – Finland’s roadmap to the circular economy 2.0 <https://www.sitra.fi/en/projects/critical-move-finnish-road-map-circular-economy-2-0/>
 European Commission: Towards a circular economy https://ec.europa.eu/commission/priorities/jobs-growth-and-investment/towards-circular-economy_fi

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