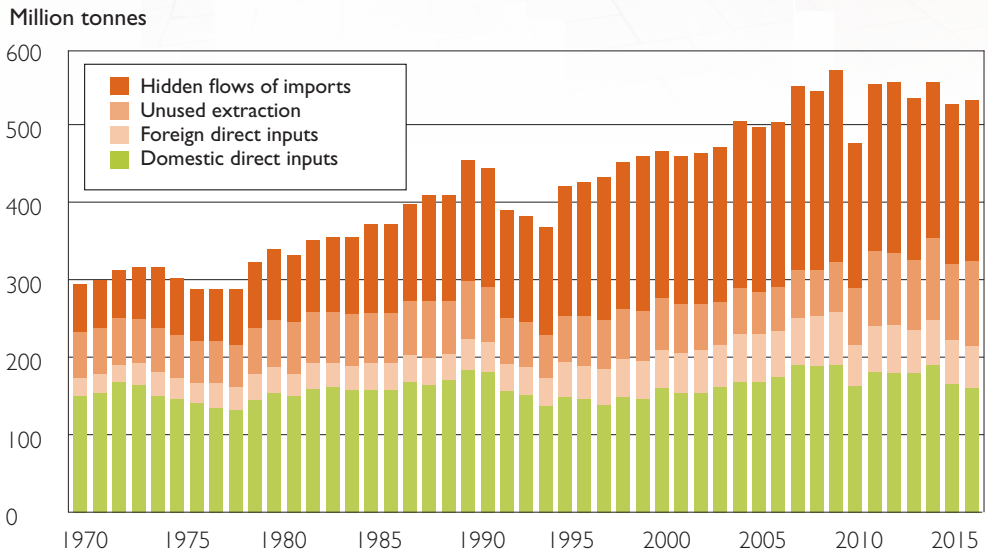
Shifting from a linear economy to a circular economy

TOTAL MATERIAL REQUIREMENT 1970-2015



Source: Statistics Finland 2017.

The circular economy must take the place of today's more linear economic system, which is based on consuming materials and simply disposing of them after their use. In the circular economy the use of virgin raw materials will be minimised, as will all forms of wastage and other negative environmental impacts throughout material cycles.

Shifting to a circular economy will improve businesses' cost-efficiency. It will also help to improve Finland's balance of current account, self-sufficiency, and job creation, while also making it easier to meet national climate targets.

The European Union also aims to promote the circular economy. The Commission's Circular Economy package was launched in December 2015.

In the circular economy, one person's waste is often another person's raw material. For this reason more cooperation across traditional sectoral boundaries will be needed. New business models, products and service concepts will be required to enhance recycling, reuse and remanufacturing. The growth of the sharing economy will also help to reduce material consumption. It is important to design products that will be durable, repairable and recyclable right from the start.

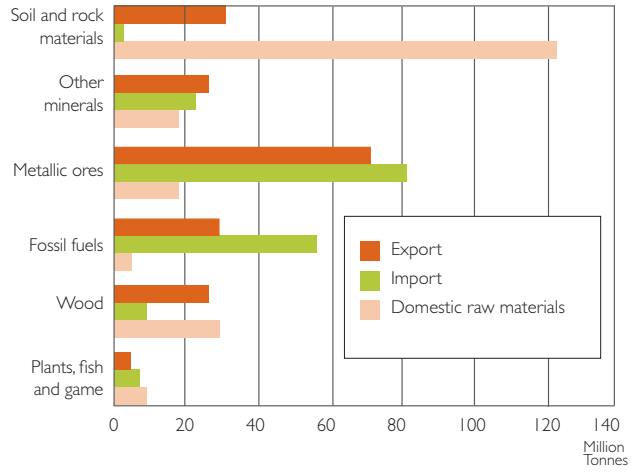
Finland's total consumption of natural resources grew from 1970s until 2009, before levelling out and remaining at roughly the same level until today.

Promoting the sustainable use of natural resources

Economic growth has so far largely been based on material production. The sector responsible for the greatest consumption of natural resources is construction.

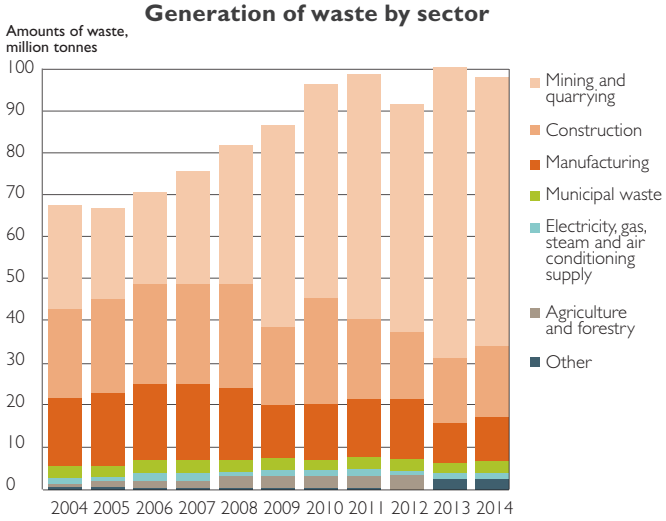
In addition to direct material inputs, the total consumption of natural resources includes hidden flows of materials such as waste rock from mines, logging waste left in forests, and hidden flows behind imported goods. These flows are highly significant.

In the global economy, materials can easily cross national borders. Therefore our responsibility to use the world's scarce and finite resources sustainably must now be extended to entire global product chains. In 2010, more natural resources were exported from Finland than imported, giving the country a positive physical trade balance, especially with regard to trade in wood, minerals and earth.



Raw material exports and imports, together with figures for the domestic use of raw materials extracted in Finland, for 2010. Source: Sustainable use of natural resources and the Finnish economy (SURE) project 2017.

Generation of waste by sector



Almost 96 million tonnes of waste was generated in Finland in 2014. Most of this waste consisted of rocks, minerals and earth material generated by mining and in construction. The extensive exploitation of mineral resources inevitably produces large quantities of waste. Trends in waste levels in construction and in manufacturing industry reflect trends in the wider economy. Municipal waste only accounts for a small fraction of total waste. Source: Waste statistics, Statistics Finland. 2017.

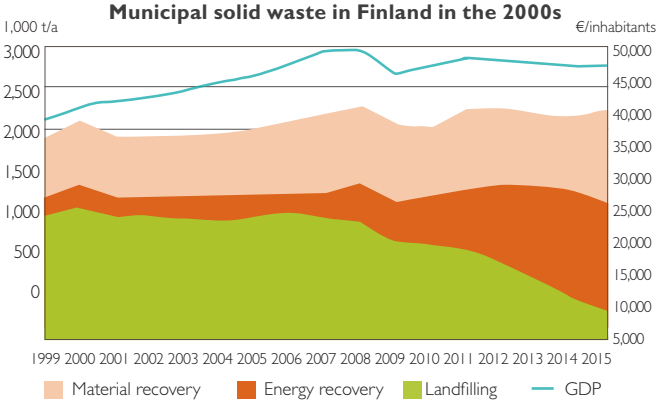
Municipal waste utilised as material and to generate energy

One significant measure of the functioning of the circular economy is quantities of municipal waste, and the degree to which this waste is utilised. In Finland, most municipal waste (65%) is generated by households. Trends in amounts of municipal waste have closely reflected wider economic trends.

Today, hardly any municipal waste ends up in landfills. Instead its material content is first sorted to enable reuse. Any unusable remaining waste is incinerated to generate energy in a nationwide network of waste-fueled power plants. This development is particularly the result of a ban on the disposal of organic waste in landfill sites. This policy aims to reduce the climate impacts of waste management.

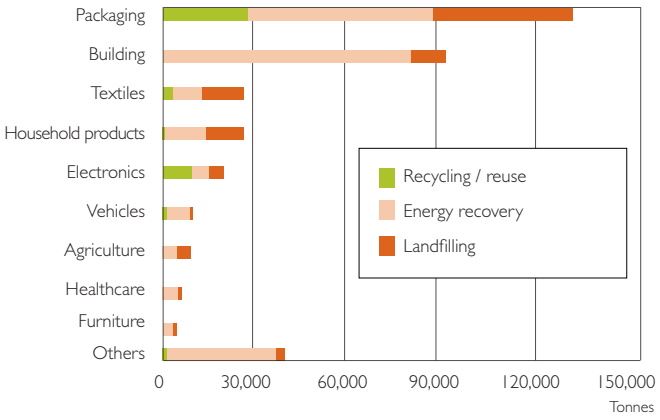
Recycling, meaning the physical recovery of material waste, has not yet been sufficiently intensified. EU and Finnish legislation both target a 50% recycling rate. Even stricter targets have been discussed in relation to the implementation of the Circular Economy Package.

Municipal solid waste in Finland in the 2000s



In 2015, about 40% of all municipal waste was recovered for material use. The amounts of mixed waste ending up in landfills have been reduced in line with targets, and the figure today is only about 10%. Source: Waste statistics, Statistics Finland. 2017.

Generation and treatment of plastic waste in Finland in 2013



Packaging is the most significant use of plastics, and thus also the main source of plastic waste. Other major users of plastics include the construction and textile industries, and producers of household goods and electronics. Source: Sahimaa, 2017.

Plastic waste streams grow with consumption levels

Recycling plastic saves on natural resources. It also helps to reduce the negative environmental impacts caused by plastic waste, including the pollution of terrestrial and marine environments. To achieve these benefits, recycled materials and products must replace the use of virgin raw materials, while the environmental impacts of the recycling process need to be minimised.

The recycling of plastics is hampered by the many different types of plastic in use. Another challenge is that plastic waste collected from consumers is often dirty, and may also contain hazardous substances.

Textile circulation

The production and consumption of textiles burden the environment due to factors including the consumption of energy and water. Environmentally harmful chemicals may also be used in textile production.

The consequent environmental loads can be reduced by promoting the reuse and recycling of textiles and textile waste. To speed up such recycling, new actions, operators and incentives are needed. There is especially a need for businesses who could utilise textile waste in their products, while demand for such products must also be nurtured.

The amounts of textile waste need to be reduced. Consumers should be educated to prefer recycled, durable and repairable textiles. Reuse could be promoted by services including textile libraries, rentals and leasing.

Flows of consumed and discarded textiles in Finland in 2012, tonnes/year (Dahlbo et al. 2015). About 20% of discarded textile products were taken into reuse or recycled through separate collections run by charitable organisations. The remaining 80% ended up in mixed waste, which was largely incinerated to generate energy.

The circular economy in the food chain – phosphorus flows in the Lake Pyhäjärvi area

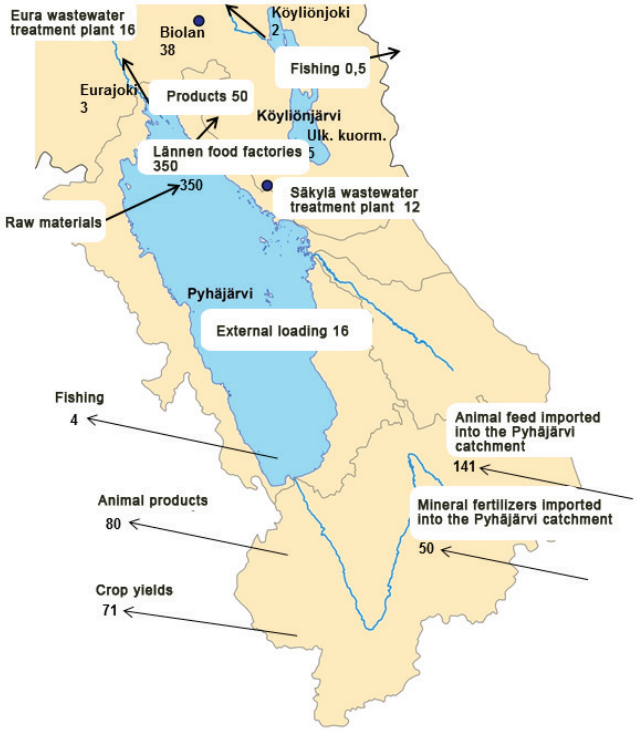
Nutrient recycling is an important element of the circular economy in the food sector. The Finnish Environment Institute has studied this issue in Southwest Finland. This region has many farms, as well as sizeable industrial facilities producing foodstuffs.

The region's largest phosphorus flows pass through the local food processing plants. Most of the phosphorus that enters these facilities remains in soil and waste crop residues, which are composted and sold on as soil improvement products.

Wastewater sludge from treatment plants in Eura and Säkylä, and the phosphorus it contains, are used to produce biogas production and composted soil improvement products. These phosphorus flows do not directly influence the state of Lake Pyhäjärvi.

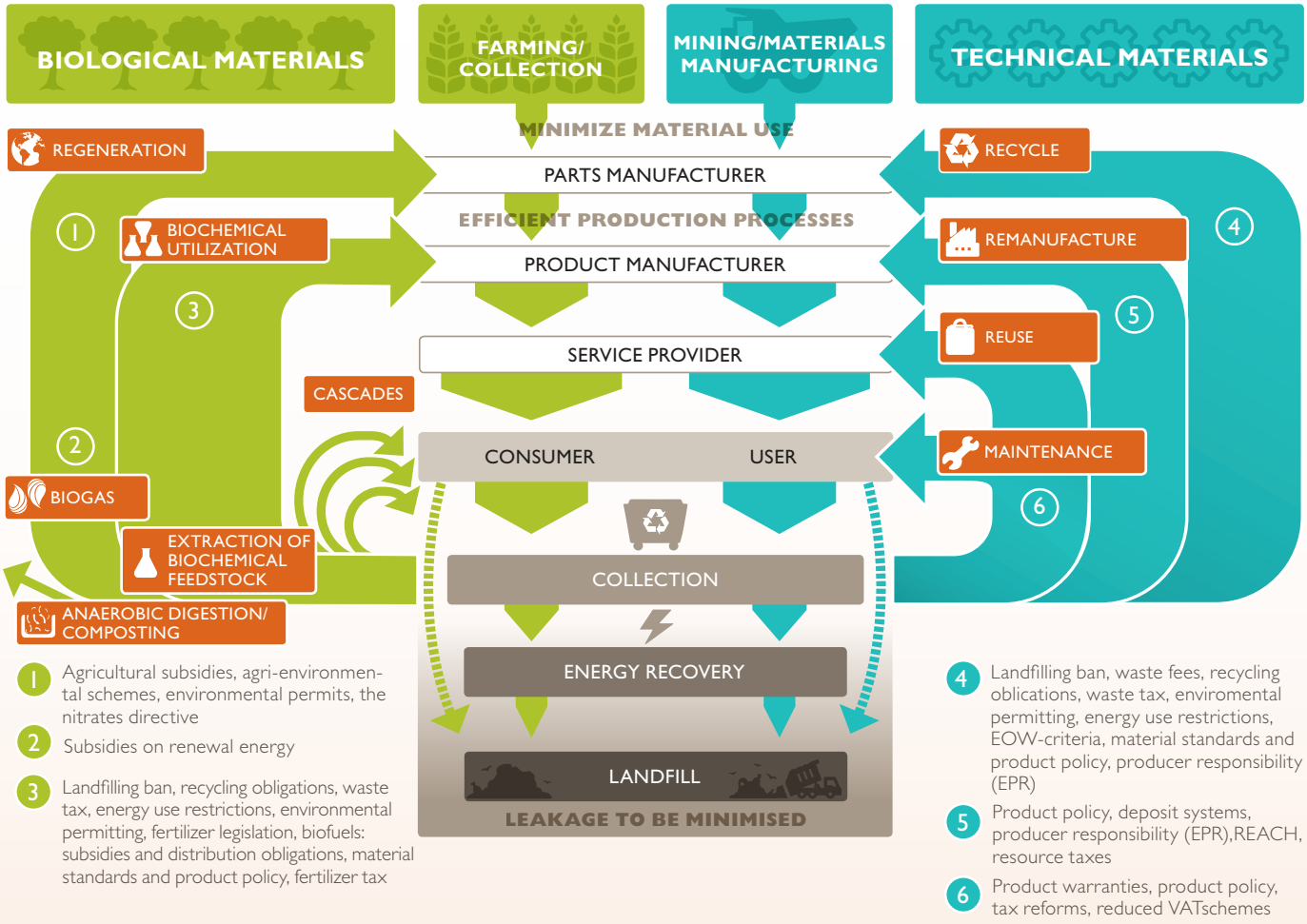
Phosphorus inputs in the lake's catchment area include animal feed and mineral fertilisers; while phosphorus leaves the area in agricultural products, fish catches, and chicken manure used by fertiliser producers. A net surplus of about 13 tonnes of phosphorus is generated overall by these different flows. Part of this surplus ends up in Lake Pyhäjärvi.

The ecological status of the lake is currently rated on the borderline between good and moderate. For the lake to achieve permanent good status, continuous water protection work will be needed to reduce phosphorus inputs. Different circular economy processes have important role to achieve this goal.



Phosphorus flows in Lake Pyhäjärvi and its surroundings (tonnes/year). The data is based on local food industry production figures and the numbers of animals on farms in the lake's catchment area.

CIRCULAR ECONOMY LEVELS AND POLICY INSTRUMENTS



The effectiveness of policy instruments on different cycles within the circular economy. Much existing legislation focuses on the outermost cycles of the circular economy – namely waste policies. Many of the instruments affecting the inner cycles limit and control the reuse of materials. The goal must be to guarantee the safety and sustainability of reuse and remanufacturing. Source: Seppälä et al. 2016.

Many favourable circular economy business models and practices already exist. A fully circular economy cannot be created entirely on a free market basis, however, and public steering policies are needed. By actively supporting the development and introduction of new solutions, production and consumption patterns can be reshaped to speed up progress and the creation of new markets. On the other hand, barriers to the creation of a favourable operating environment for the circular economy, including various material and societal path dependencies, must still be identified and removed.

The transition to the circular economy will be shaped by infrastructural development and public procurement policies, as well as economic and regulatory instruments. The circular economy will affect our entire society, so it is important that policy instruments are coherent.

Product planning, research and development, and experimentation will all play important roles in developing new circular economy solutions, producing new knowledge, assessing impacts, and spreading best practices. Finnish circular economy technologies and services have significant export potential.

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Authors: Riina Antikainen, Helena Dahlbo, Sirkka Koskela, Jari Koskiaho, Tuuli Myllymaa, Olli Sahimaa, Hanna Salmenperä, Jyri Seppälä ja Eija Putkuri.

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