Statistics Finland

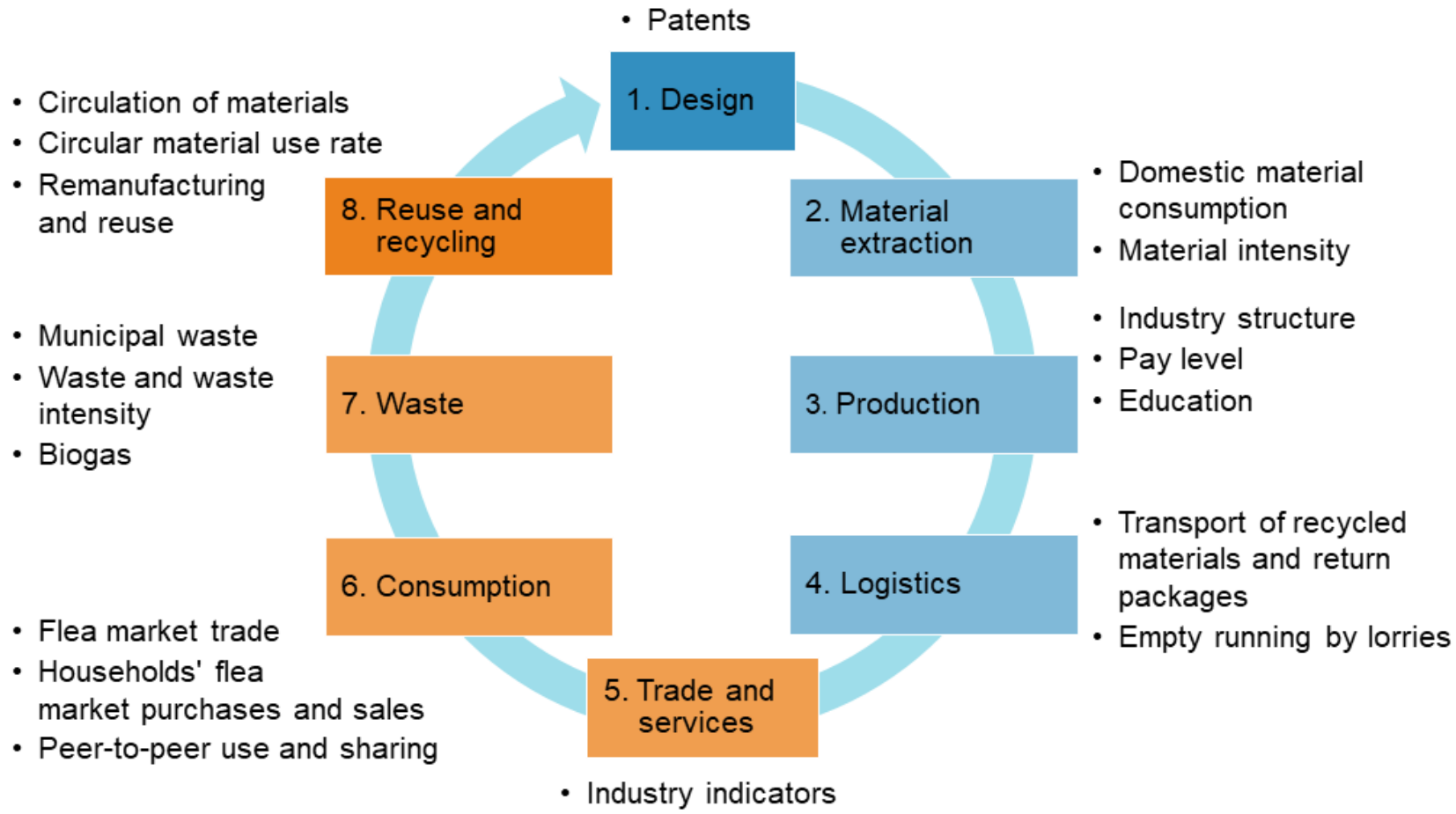
Circular economy indicators in Finland: DMC, CMU, biogas utilization and municipal waste statistics

Tuomas Kaariaho,
Senior statistician, Statistics Finland
tuomas.kaariaho@stat.fi

Circular Economy indicators

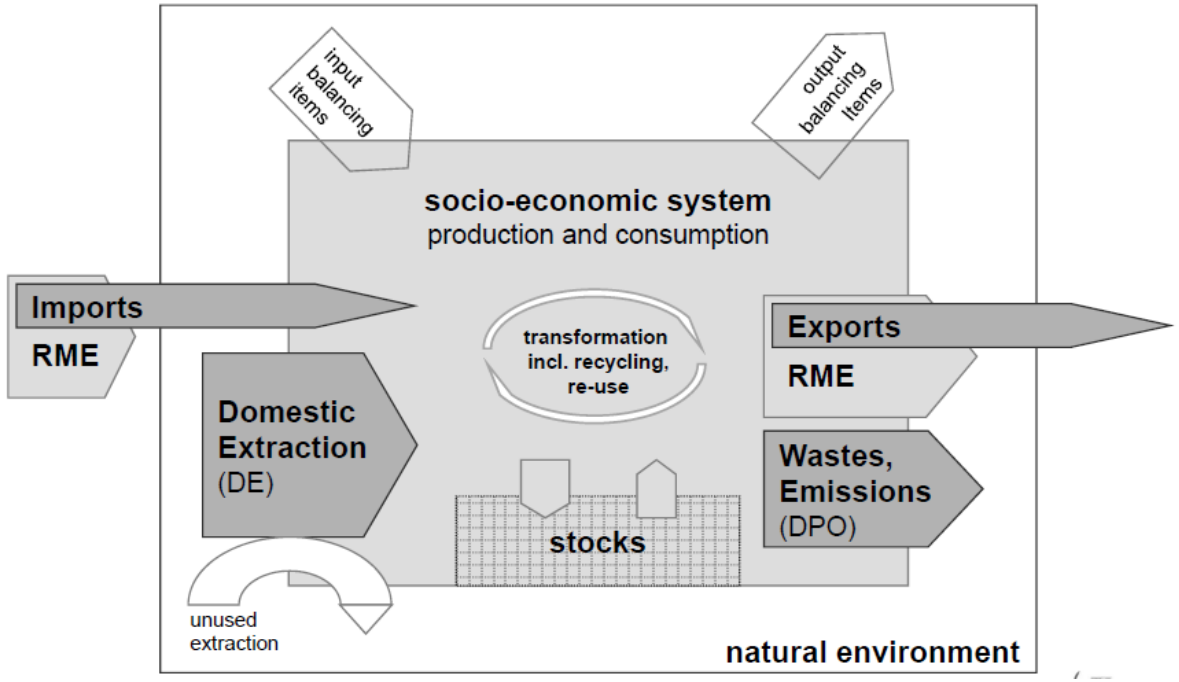
- Statistics Finland produced the indicators describing the circular economy for the first time in 2020 as a part of CIRCWASTE-project
- Indicators were updated in 2022, next update in December 2023.
- The aim was to produce indicators describing the extent and development of the business activity of the Finnish circular economy.
- The indicators are mainly based on statistical data collected for other purposes and they can be updated annually.
- Measuring and monitoring indicators is essential for understanding the circular economy and for developing solutions.

Indicators for the circular economy



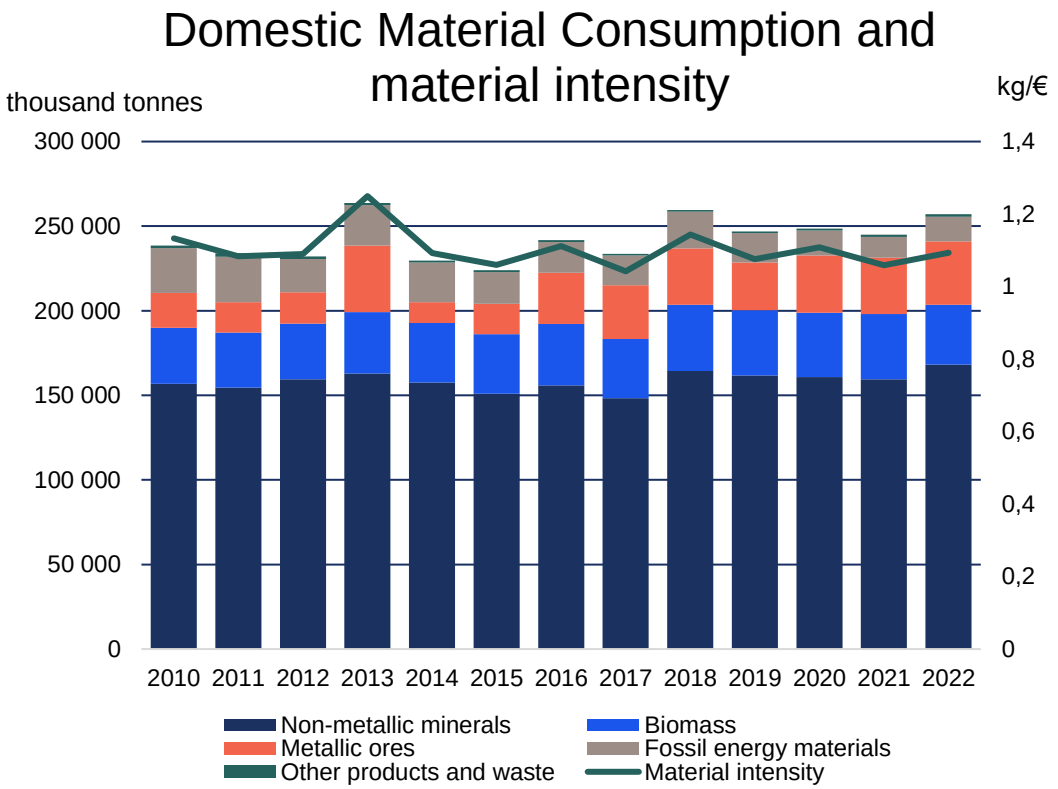
Domestic Material Consumptio (DMC)

- DMC measures the total amount of materials directly used by an economy.
- Calculated as the annual quantity of raw materials extracted from the domestic territory (DE), plus all physical imports minus all physical exports.
- Excludes unused extraction, i.e. materials that do not enter the economy as inputs.
  - Unused parts from felling, overburden from mining, unused by-cath in fishery
- Imports and exports include raw materials, but also other goods and commodities.
  - Upstream hidden flows.



Domestic Material Consumption and material intensity

- Four main material categories: Biomass, metallic ores, non-metallic minerals and fossil energy materials.
  - Finland has shown slight increase of DMC from 2010.
  - Largest decrease in fossil fuel materials.
  - Largest increase in metallic ores.
- Largest DMC per capita in EU
  - Finland has large primary sector, i.e., forestry and mining.
- Material intensity describes the national economy's dependency on natural resources.
  - Long run decline of material intensity implies decoupling.
  - Finland's material intensity has stayed around 1 kg/€.



Circular material use rate

- The circular material use rate measures the share of material recovered and fed back into the economy.
- The CMU rate is defined as the ratio of the circular use of materials (U) to an indicator of the overall material use (M):
- The calculation considers the effects of imports and exports of material recovery of waste.
- A higher CMU rate value means that more secondary materials substitute for primary raw materials

$$CMU = \frac{U}{M}, \text{ where}$$

$M = DMC + U$ (Overall material use)

$U = RCV_R - IMP_W + EXP_W$ (foreign trade corrected recovery of waste)

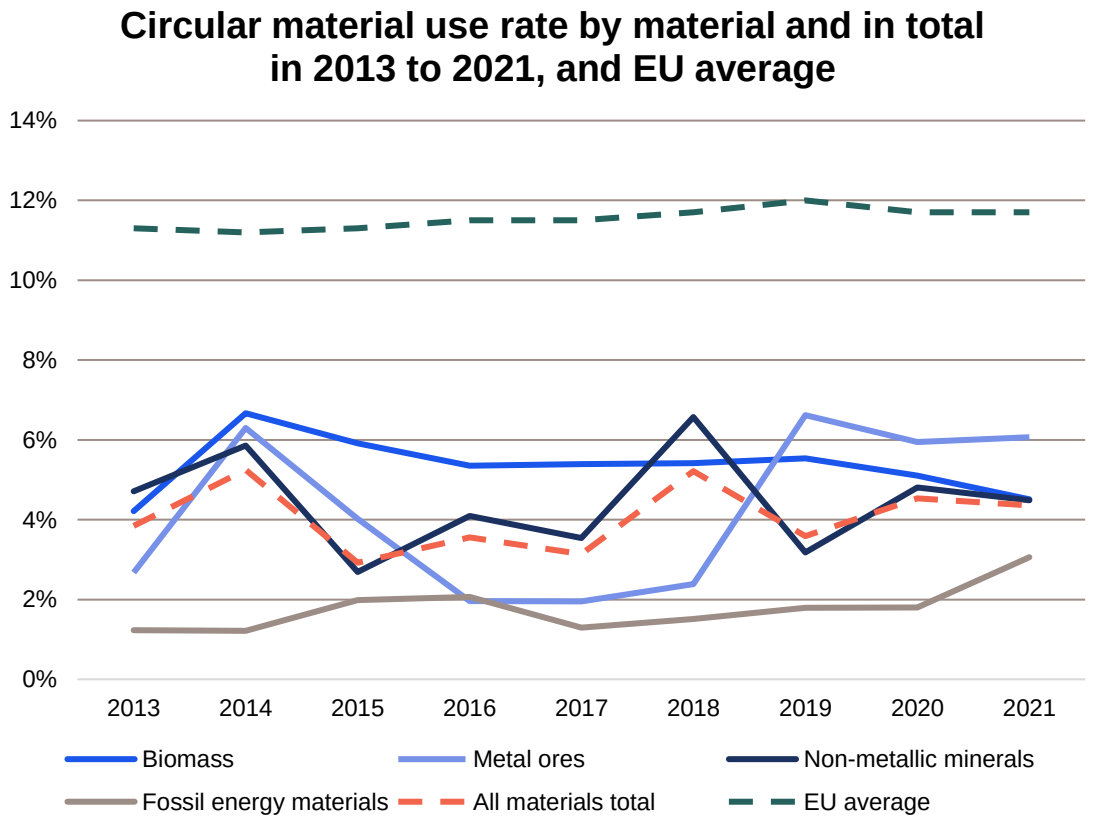
RCV_R = Recovery of waste

IMP_W = Imports of material recovery of waste

EXP_W = Exports of material recovery of waste

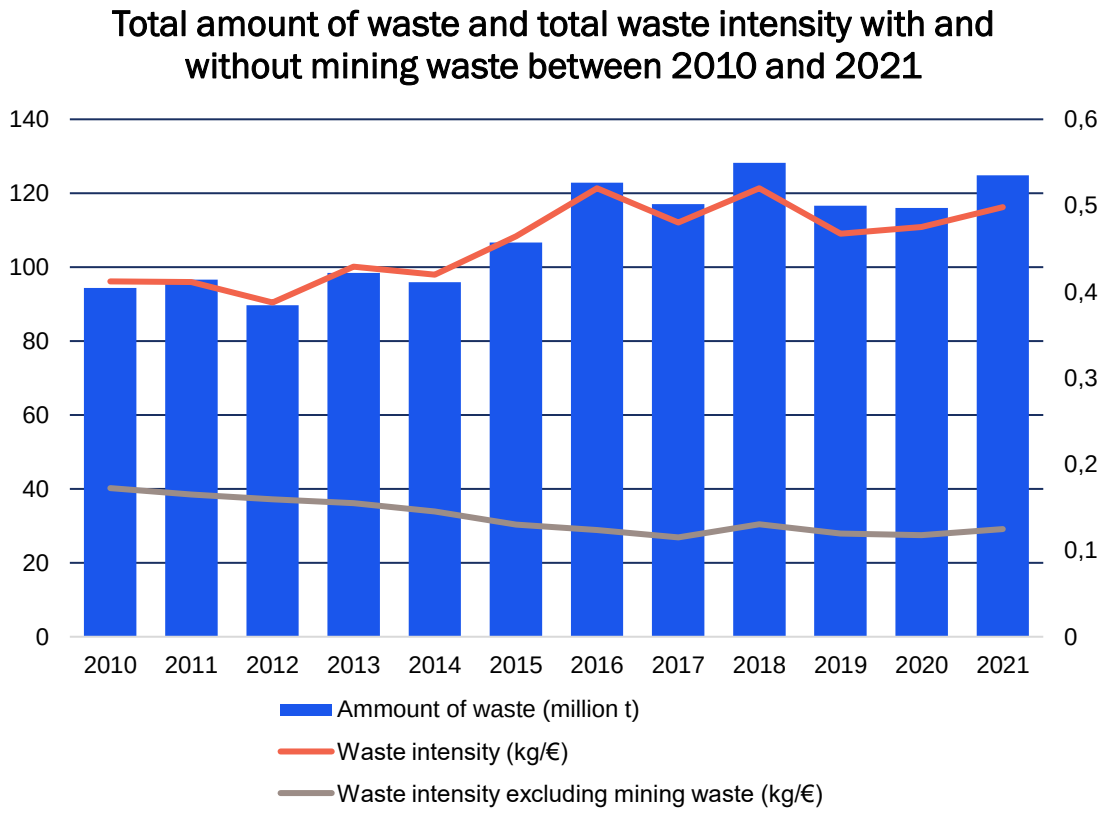
Circular material use rate

- The indicator is compiled as a time series for 2013 to 2020 and additionally divided into material categories according to economy-wide material flow accounts: biomass, metal ores, non-metallic minerals and fossil energy materials.
- In 2021 total CMU was 4.4 %.
- The circular material use rate in Finland is significantly below the EU average.
  - One reason is large primary sector (forestry and mining) and high consumption of sand and gravel and subsequent high DMC.



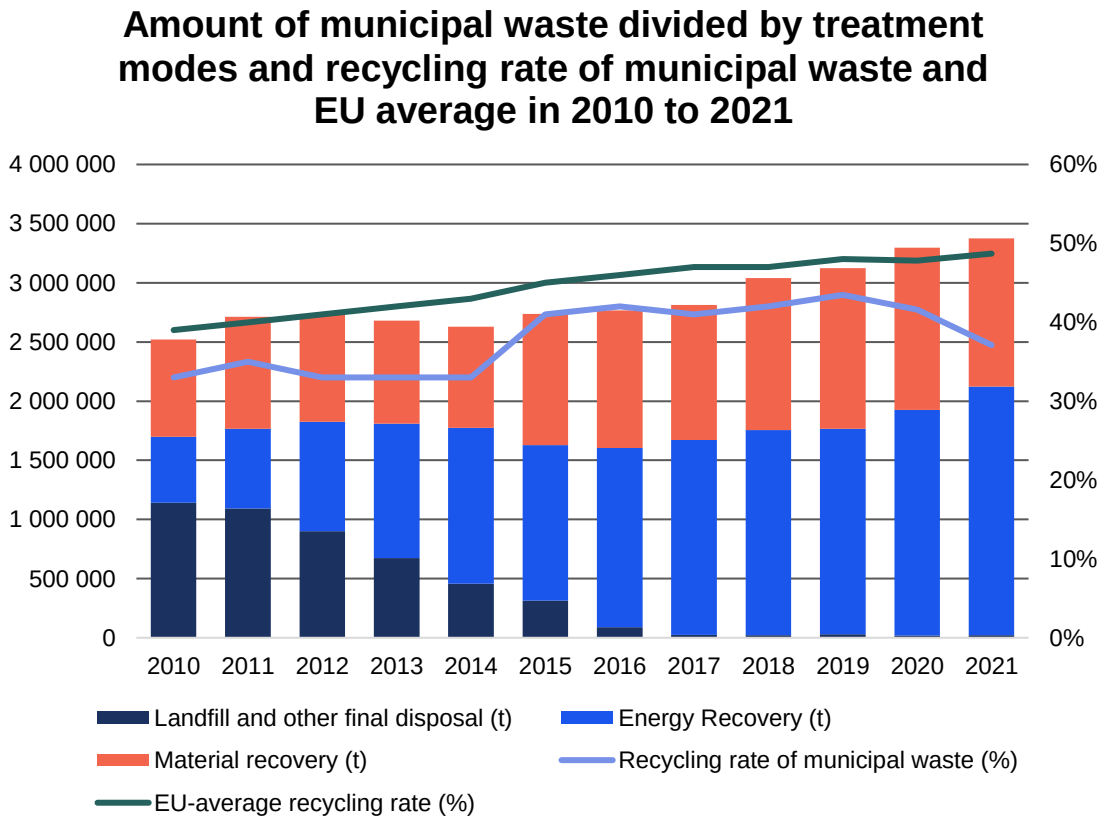
Total amount of waste and waste intesity

- The majority of Finland's waste, around 91 per cent (2021), is mineral waste generated from mining and quarrying and construction, most of which is stockpiled in landfills.
- In 2021 total amount of waste was second highest between 2010 and 2021
- Waste intensity describes the ratio of waste to gross domestic product.
  - the smaller the waste intensity, by default the more products and services have been produced with less waste.
  - Total waste intensity has had increasing trajectory.
  - Waste intensity excluding mining waste has shown slight decline.



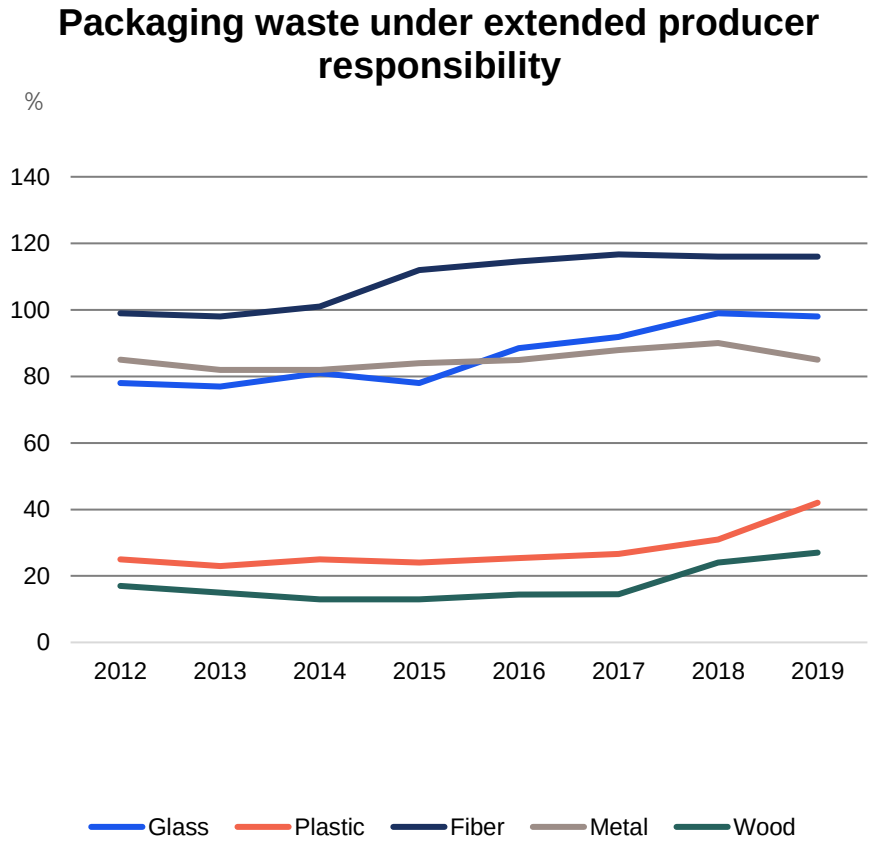
Recovery of Municipal waste

- Waste generated in housing, as well as comparable waste from trade and services and corresponding waste from industry support activities.
- The amount of municipal waste has grown during the reference period and was 3.4 million tons in 2021.
- The recycling rate of municipal waste has remained at 41% to 43% since 2015, in 2021 it dropped to 37%.
- The EU average is around 48%
- According to the new waste regulation, recycling rates for municipal waste should be at least 55 per in 2025, and 60 per cent in 2030, and 65 per cent in 2035.



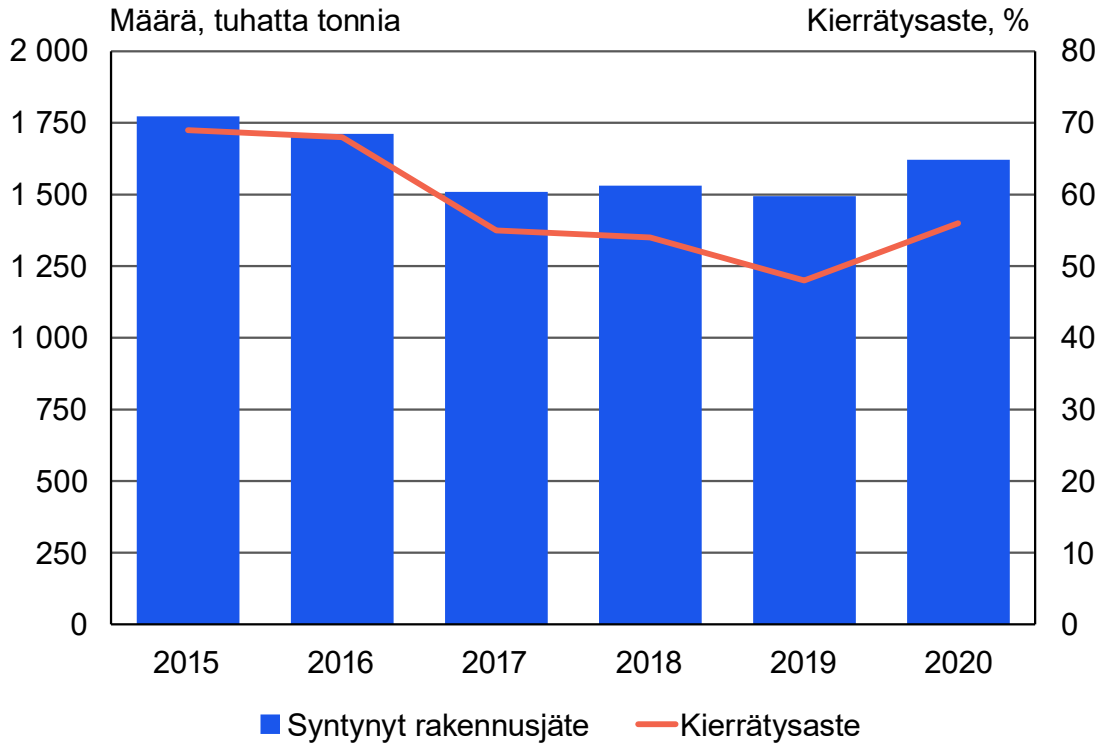
Packaging waste

- The overall target for recycling rate for packaging waste is 65% by year 2025.
- Finland has reached the overall target, but still lacks behind in the recycling rate of plastic.
- The recycling rate of over 100% of fiber packaging is due to the fact that packaging that is not counted as part of the generated packaging waste also ends up being recycled.
  - Packaging from smaller revenue businesses,
  - Packaging from foreign online stores,
  - Packaging that comes with passenger imports.
- Recycling rates of packaging waste includes packages recycled domestically and in other countries.



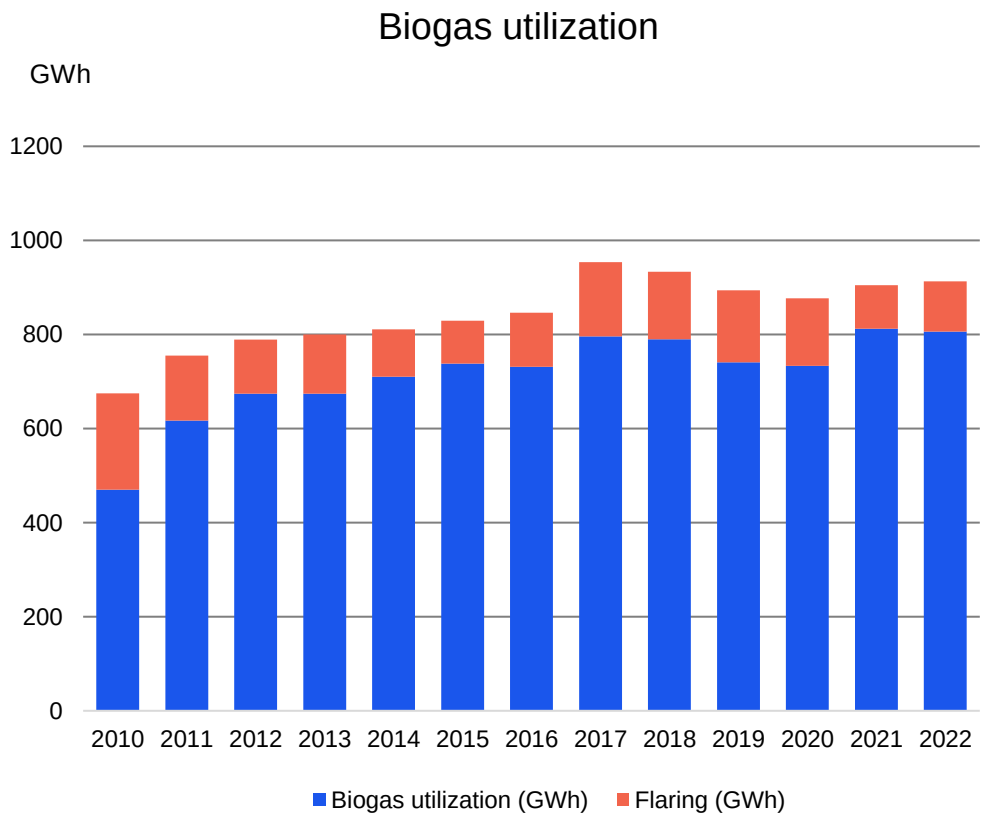
Construction and demolition waste

- In Finland, construction and demolition waste is the second-largest waste category after mining waste. In 2021, a total of 12.4 million tons of such waste was generated, accounting for just under 12% of total waste.
- The figure excludes mineral waste from construction.
- The recycling rate of construction waste refers to the proportion of waste that has been utilized as a material through recycling or for landfill purposes.
- Both construction and demolition waste and recycling rate decreased between 2015 and 2019 but increased in 2020.

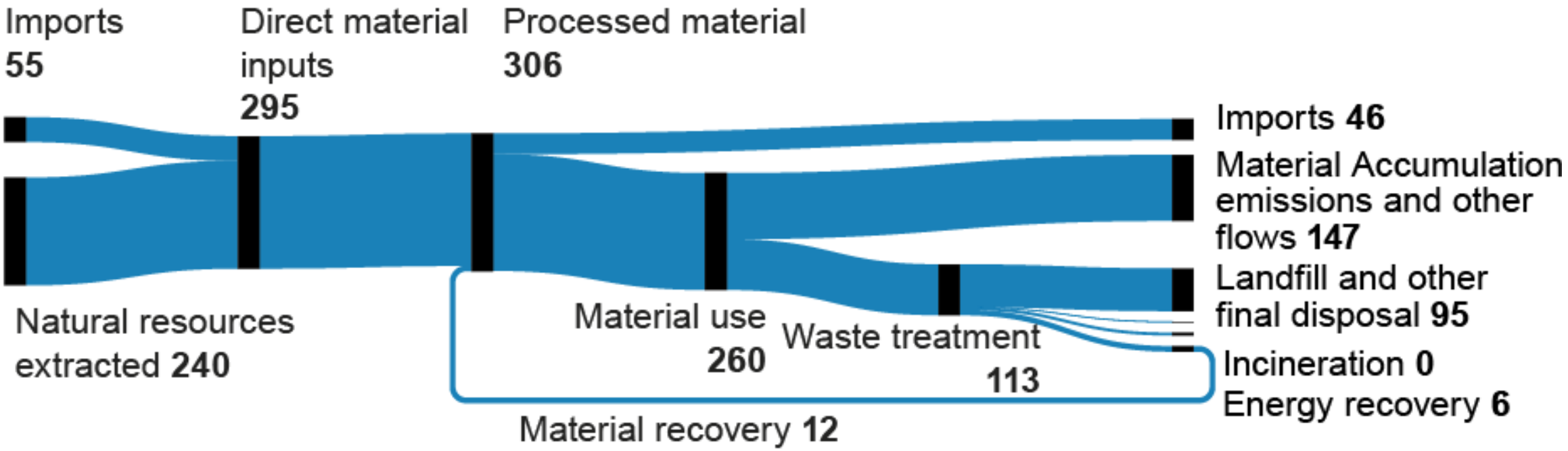


Biogas utilization

- The utilization rate of biogas describes how much of produced biogas has been utilized, that is, what kind of demand biogas has.
- As a backup solution, excess biogas has to be flared, whereby it is wasted.
- Production of biogas has steadily increased over years.
- On average the utilization rate of biogas has been approximately 85%. In 2021, the utilization rate rose to 90% when the share of flaring decreased.
- The reduction in the amount of landfilled waste has reduced the production potential of biogas.
- Still lot of untapped potential in agriculture



Circulation of materials in 2020



Statistics Finland

Thank you!

Statistics Finland | Tuomas.kaariaho@stat.fi