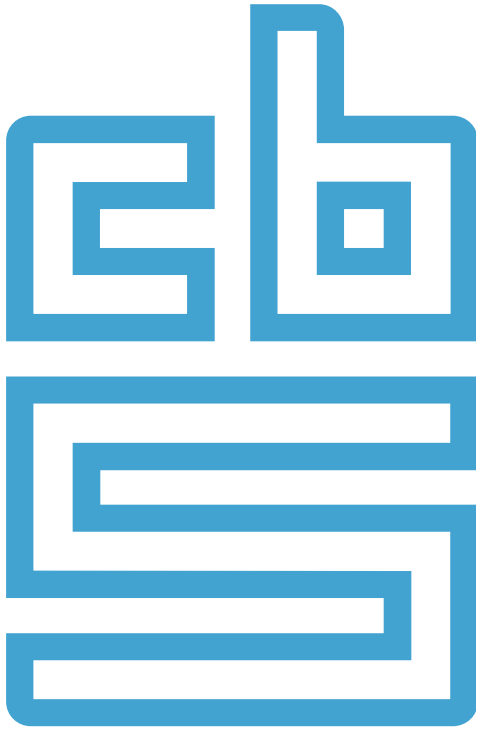

Decomposition analysis in the Netherlands: material use related to climate change

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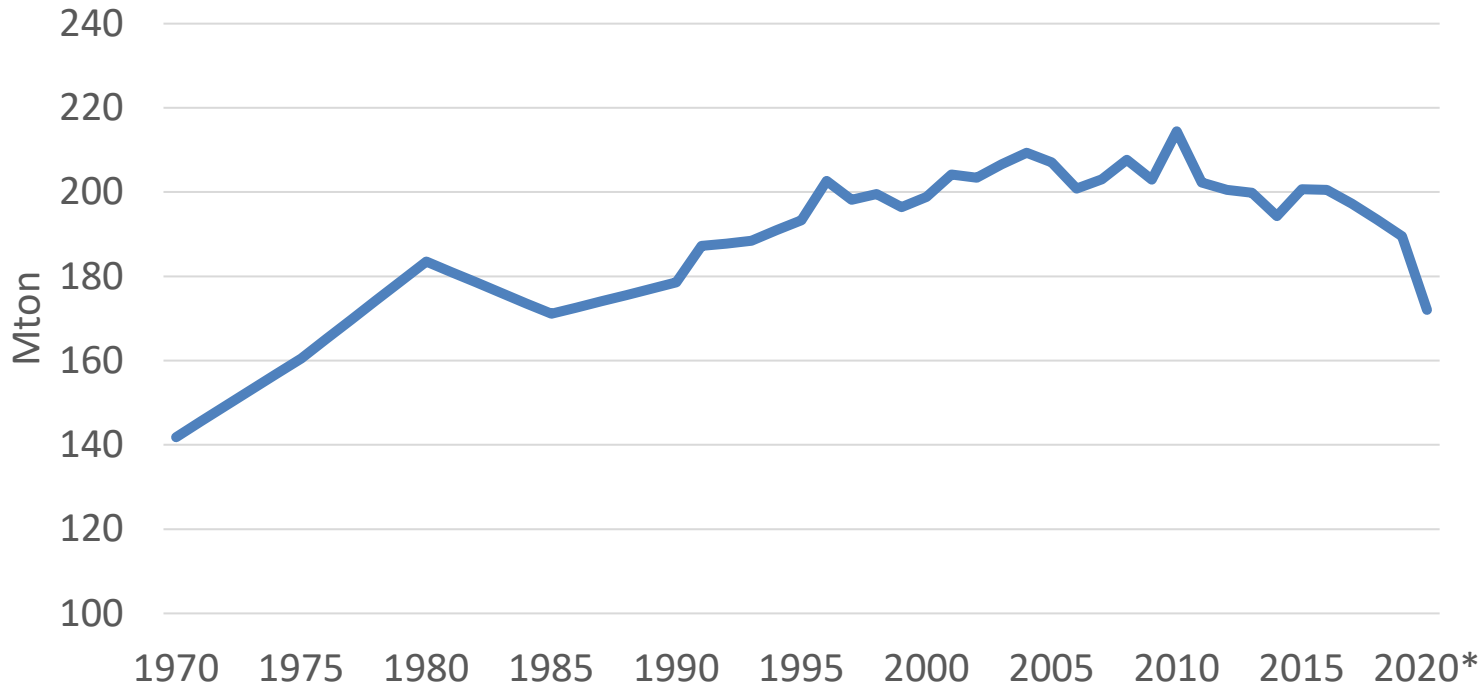
Content

- Context and objectivies
- Compilation of long time series
- Decomposition analysis
- Results
- Conclusions

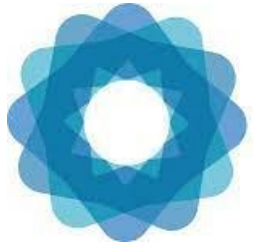
Introduction

- There is a growing need for information on structural economic changes that underlie a change in resource use and, hence, a transition towards a **circular economy**
- The contribution of a circular economy to **the reduction of climate change** is paramount in order to achieve EU's climate targets.
- **Index Decomposition Analysis** can be used to investigate the drivers behind CO2 emissions, including circular economy

Objective: identify the drivers for changes in CO2 emissions



Data needs



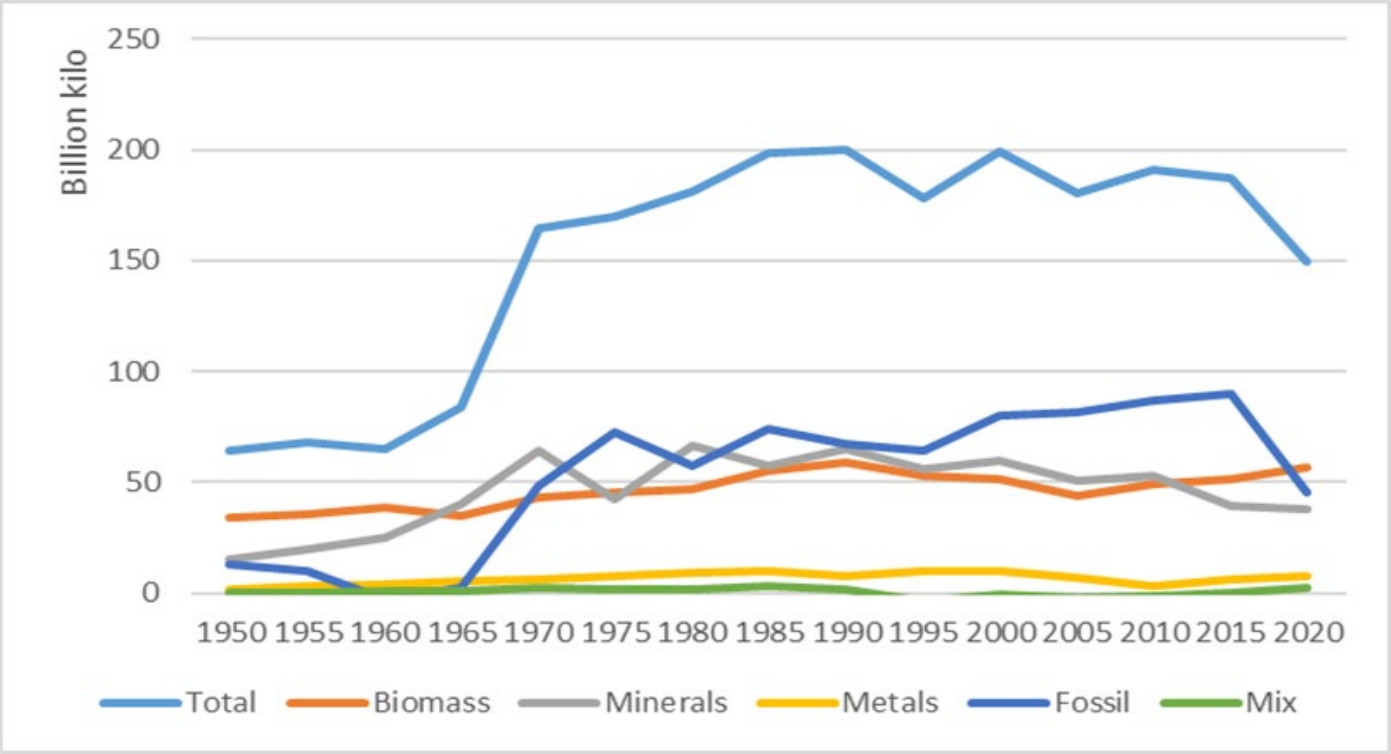
System of Environmental Economic Accounting

- Data from **Environmental accounts and National accounts:**
  - Air emissions accounts
  - Economy wide material flows acounts
  - Waste accounts
  - Value added data
- **Long time series:** provides insight for policymakers into future structural changes that can contribute to a transition towards a more circular economy.

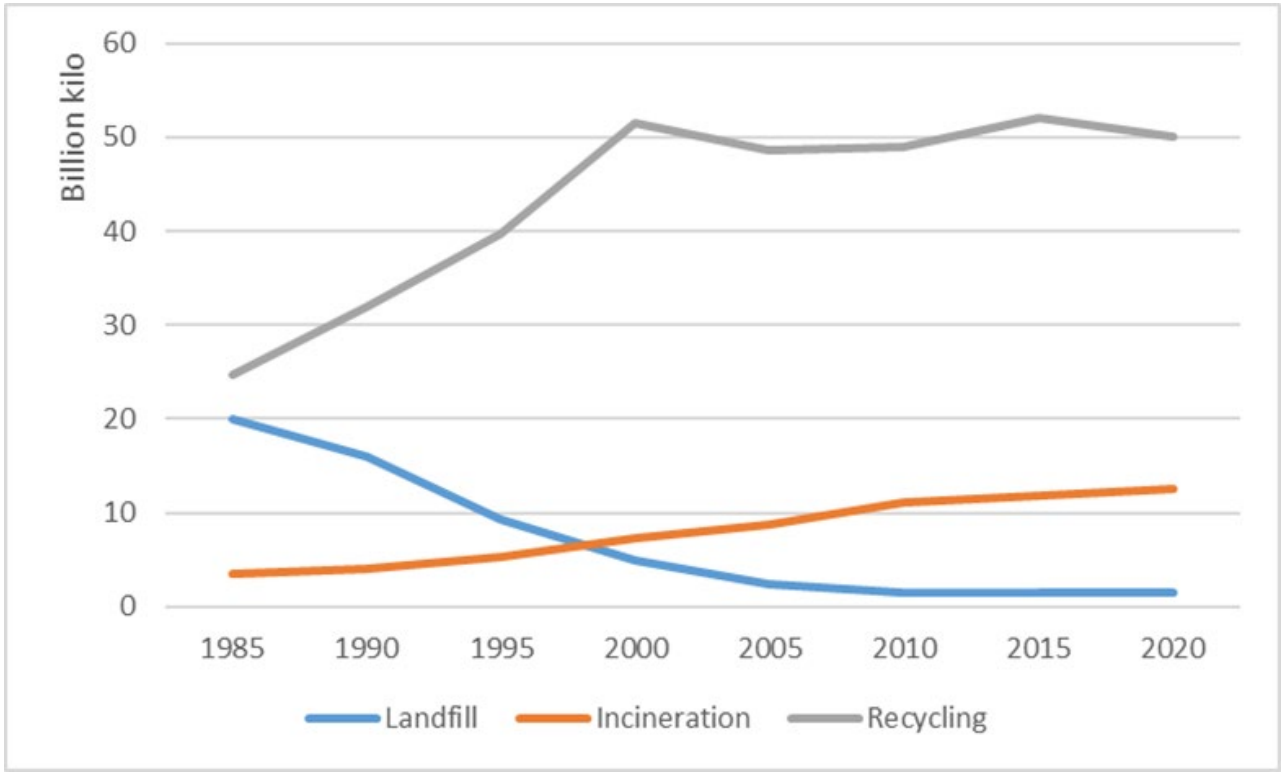
Compilation of long time series

- Data from 1970 onwards
- The publicly accessible online data library of Statistics Netherlands (energy statistics, National accounts data etc.)
- Data from other institutions (FAO, World Resource Institute), scientific articles or Statistics Netherlands archive publications
- Some data need to be estimated, for example on the basis of proxies or by using interpolation.

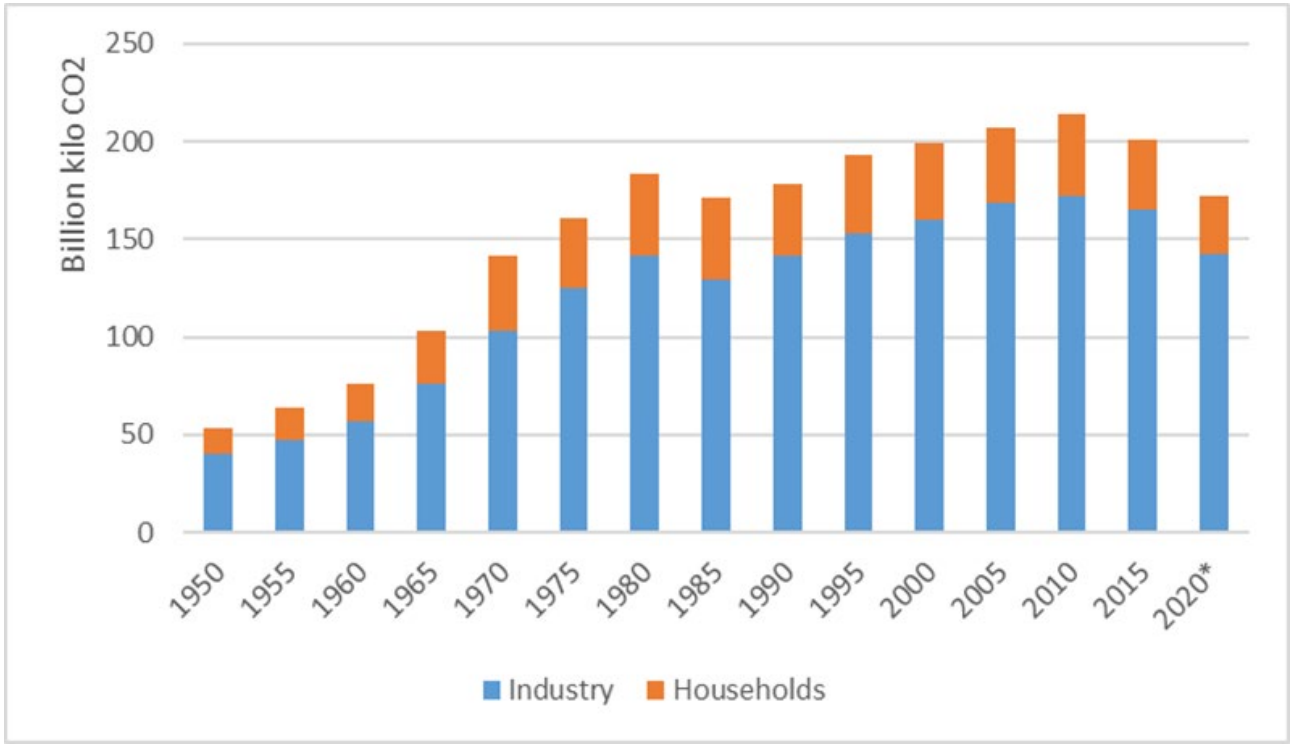
Domestic Material Consumption for main material categories



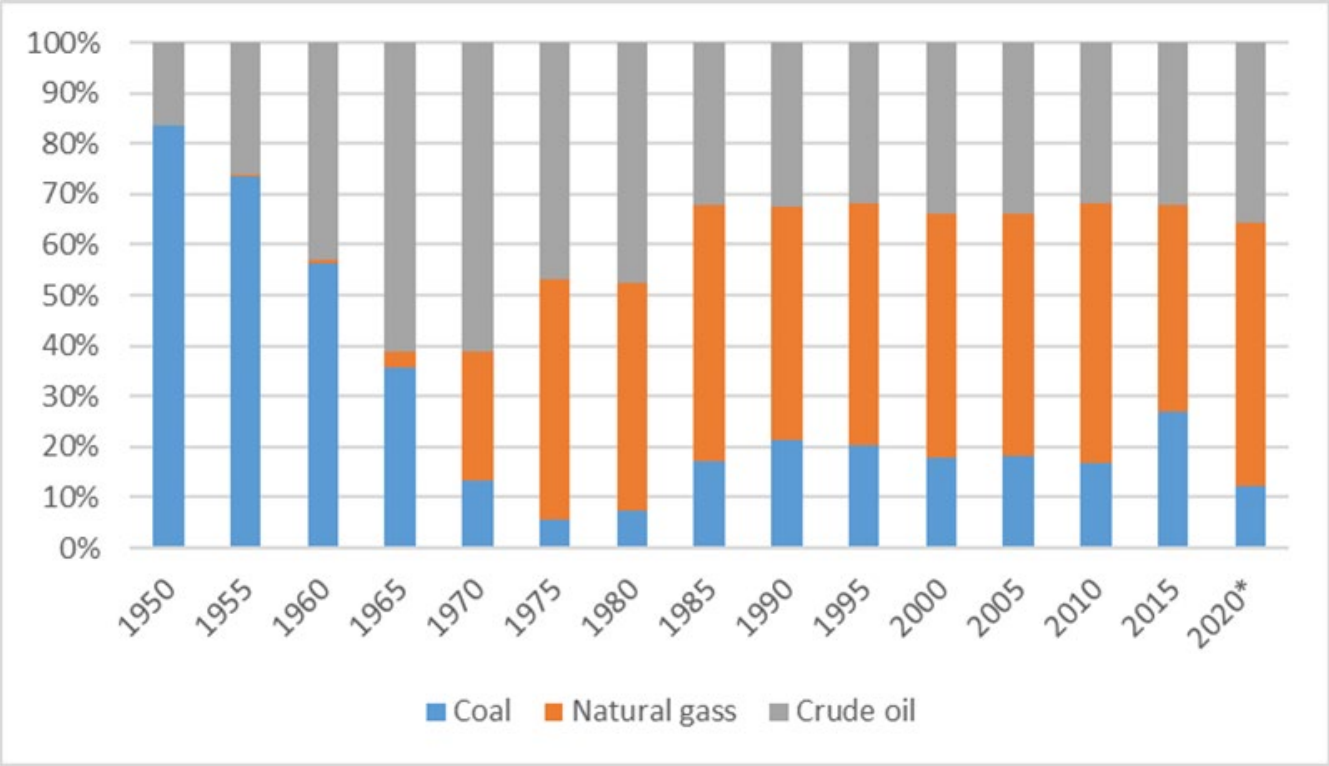
Waste treatment by type in the Netherlands



CO_2 emissions by industry and households.



Energy mix of total energy used



Decomposition analysis: methodology

- **Index decomposition analysis (IDA):** decomposes the variable under consideration into a number of ‘drivers’.

$$\Delta Y = \Delta X(1) + \Delta X(2) + \ldots + \Delta X(n),$$

- We applied an IDA model from Eurostat (2022) with data from the Netherlands

Drivers of CO2 emissions

Gross value added.

Material intensity

Population – material consumption ratio.

Carbon intensity of the energy mix

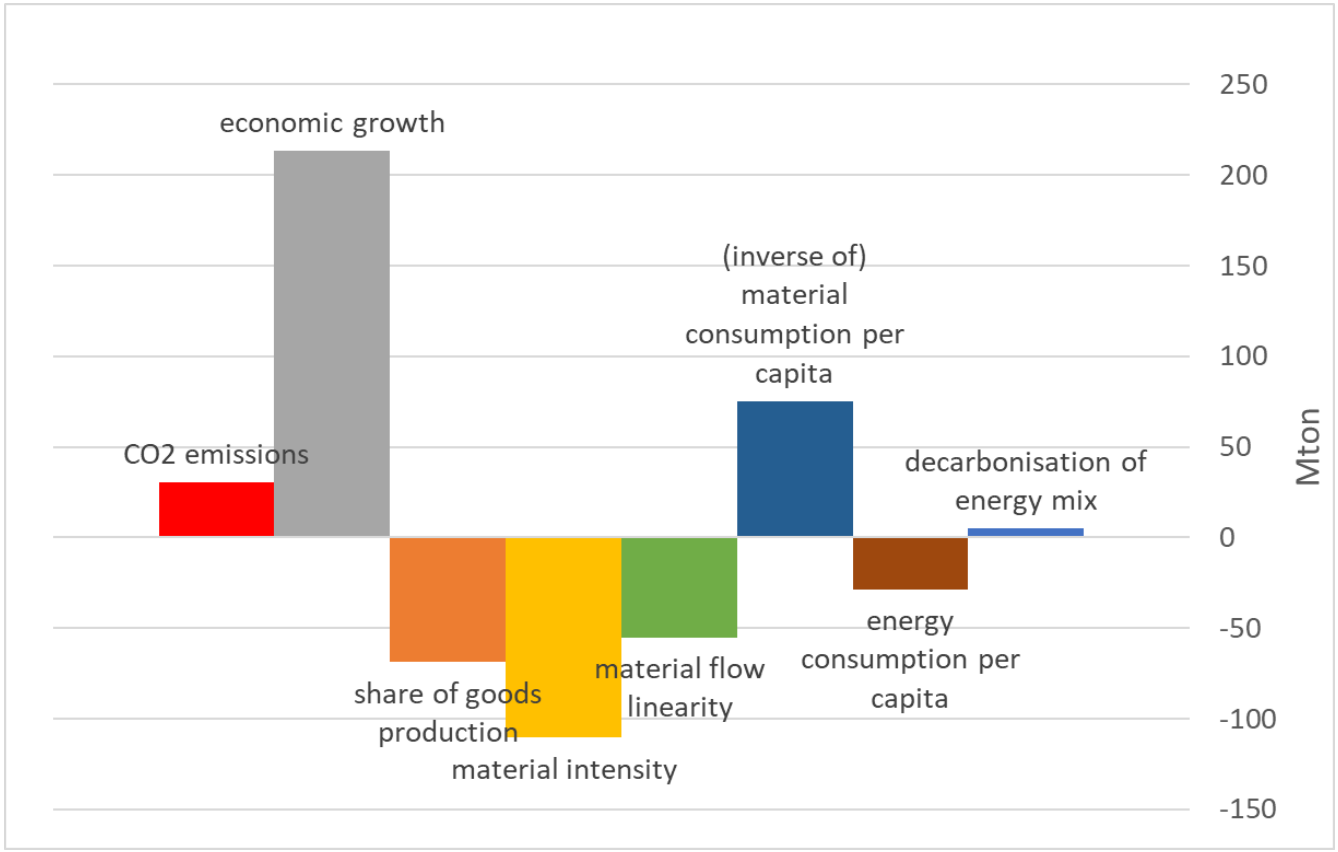
$$CO_2 = VA \times \frac{VA_G}{VA} \times \frac{(DMCexFossil + U)}{VA_G} \times \frac{DMCexFossil}{(DMCexFossil + U)} \times \frac{Pop}{DMCexFossil} \times \frac{E}{Pop} \times \frac{CO_2}{E}$$

Share of the goods sector in total value added

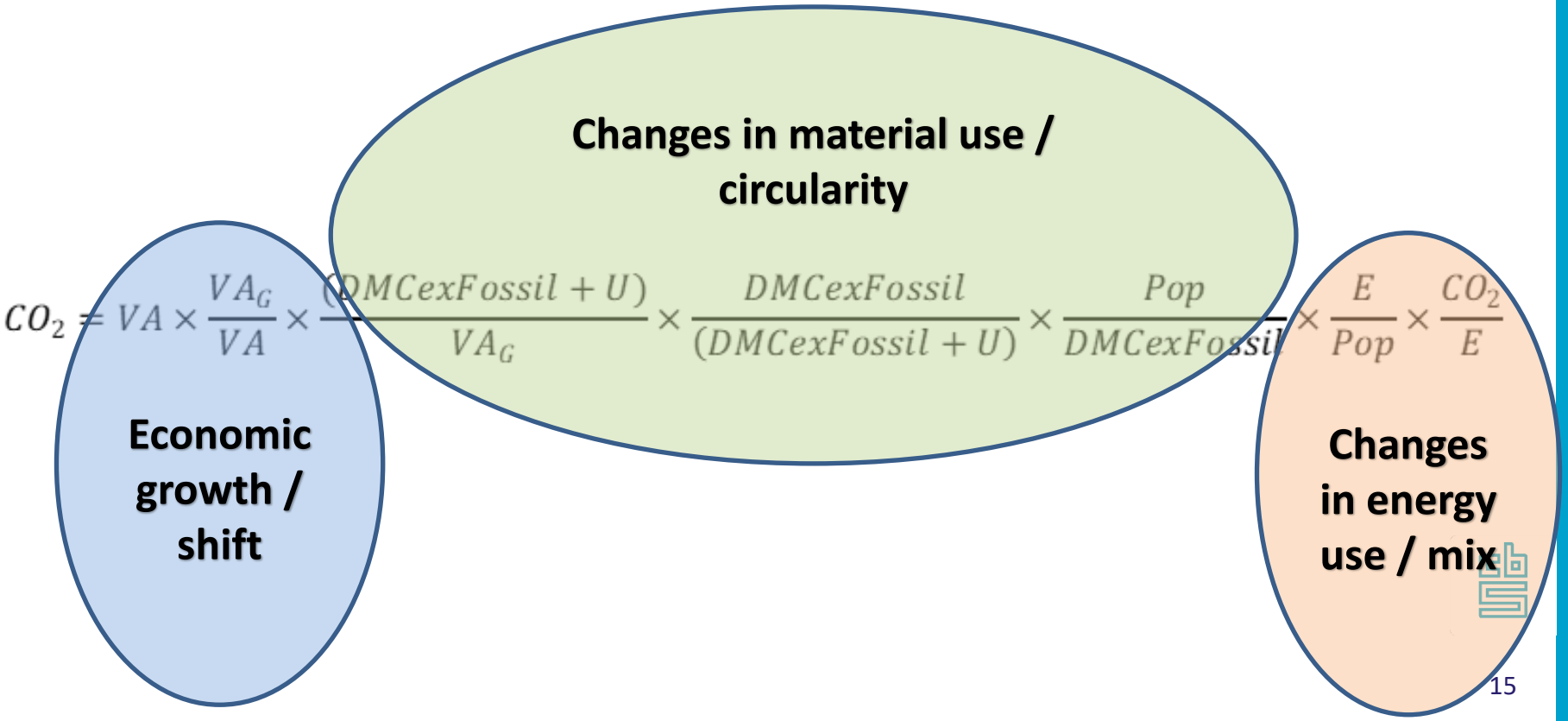
Material flow linearity

Energy use per capita

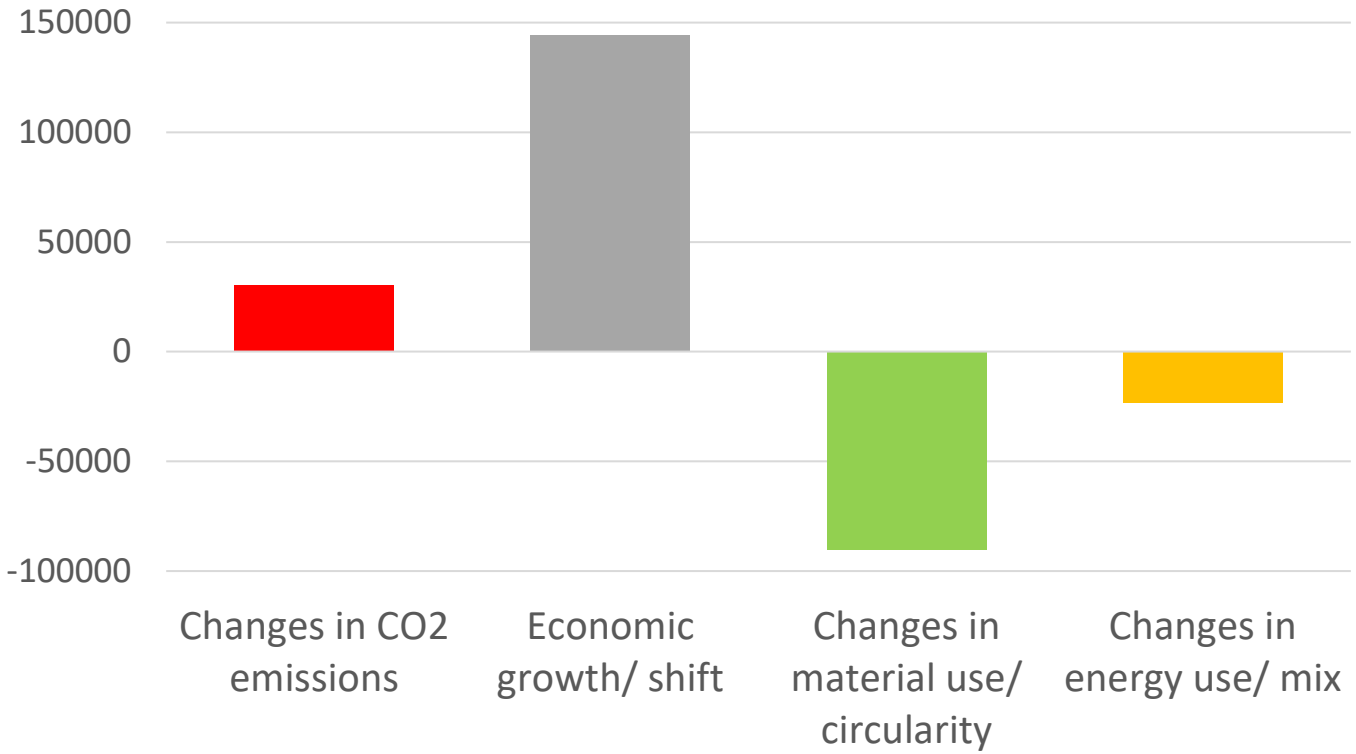
Decomposition CO2 emissions, 1971-2020



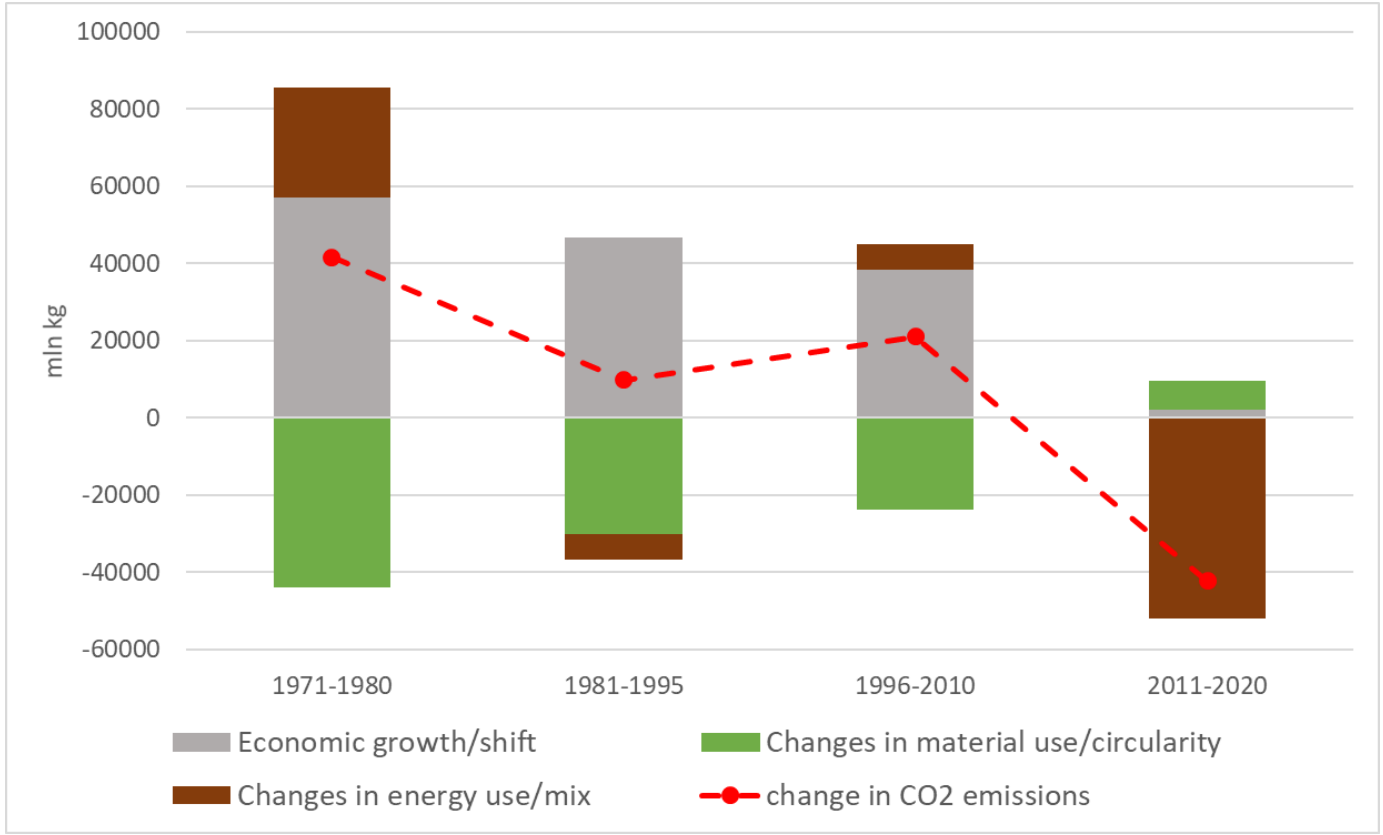
Drivers of CO2 emissions



Decomposition CO2 emissions, 1971-2020

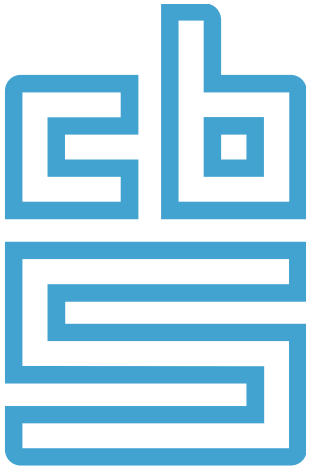


Decomposition, four periods



Conclusions

- Decomposition analysis provide **a tool for an integrated analysis** of climate change, circular economy, energy transition and sustainable production and consumption.
- In the period up to 2011, **economic growth** was the driving force for the increase in CO2 emissions
- In the same period, **circularity** has on balance contributed to a reduction in CO2 emissions. This is mainly due to more efficient use of materials and increased recycling.
- In the period 2011-2020, **more efficient energy use** in particular was the driving force behind the decrease in CO2 emissions. Contributions from circular economy strategies are not reflected in the last period.
- **Further testing** of the robustness of the model is needed



Facts that matter