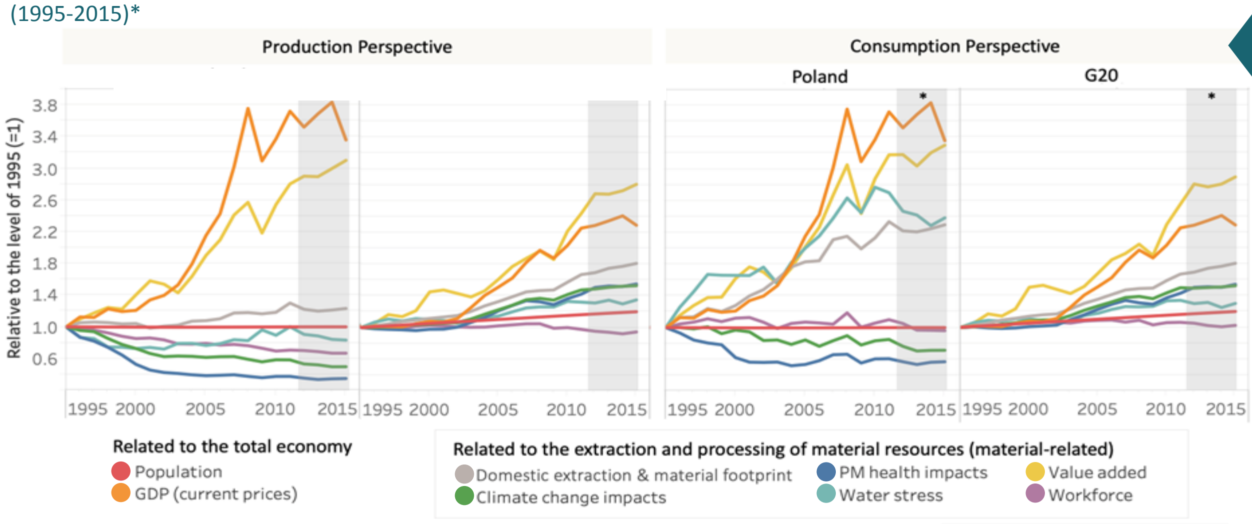
Natural Resource Use in Poland

Status, Trends, and Solutions

Status and trends of Natural Resource Use

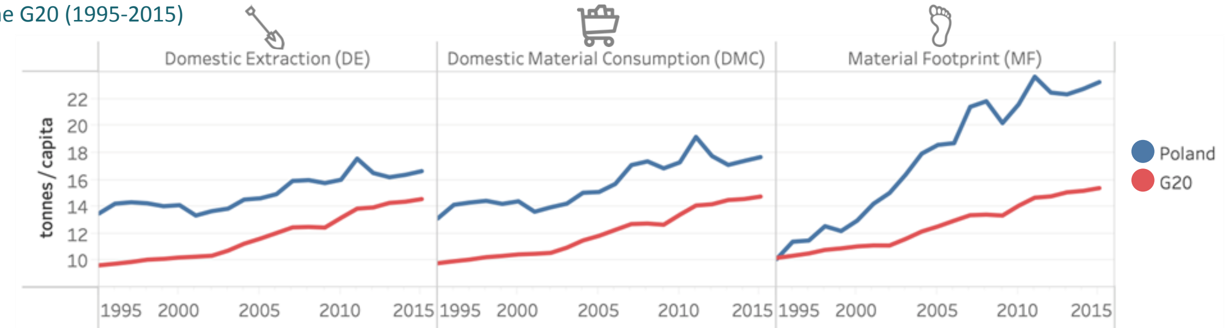
Figure 1: Population, GDP, and material-related impacts from production and consumption perspective in Poland and in the G20 (1995-2015)*

See glossary on page 2



Source: IRP database, Exiobase v3.4 and Cabernard et al. 2019 *Years from 2012–2015 are now-casted and thus underly a higher uncertainty*

Figure 2: Domestic extraction (DE), domestic material consumption (DMC), and material footprint (MF) per capita in Poland and in the G20 (1995-2015)



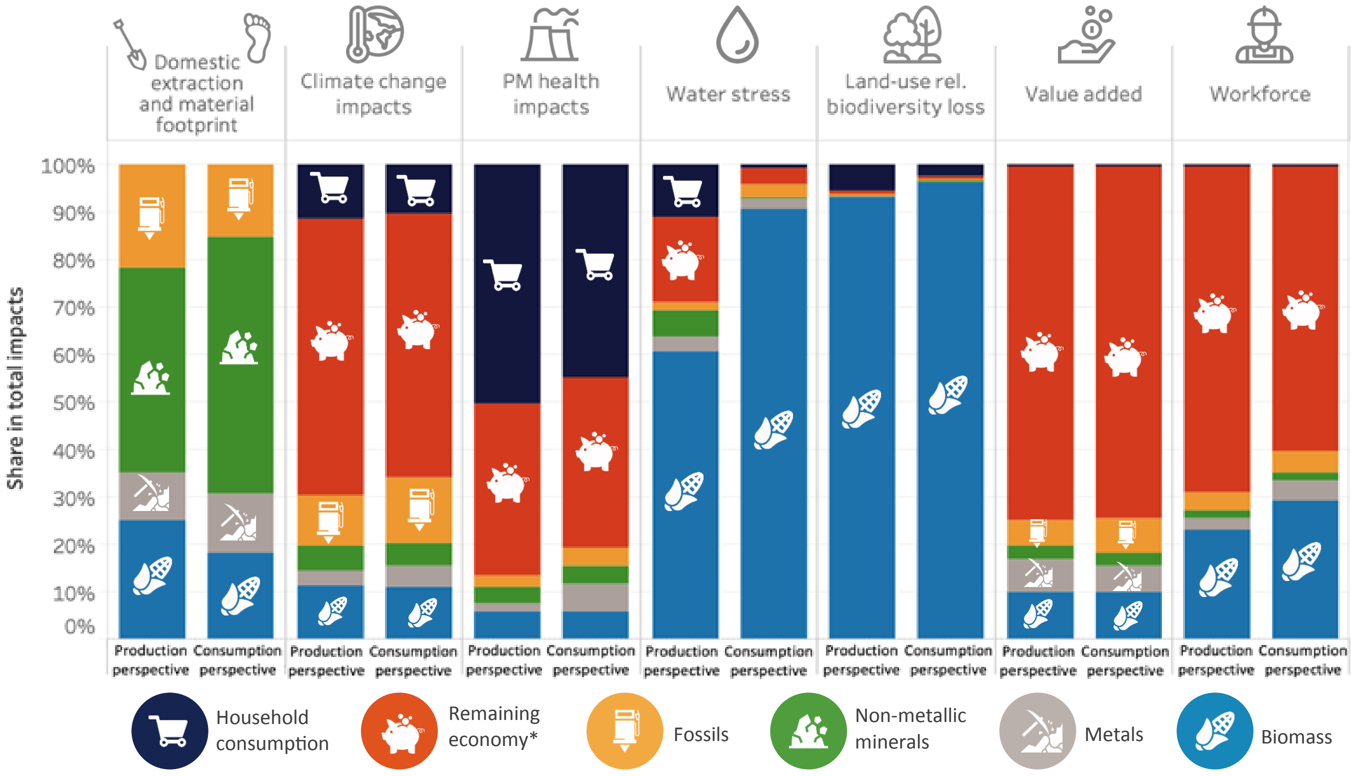
Source: IRP database

From 1995 to 2015

- Population remained constant, while GDP increased by a factor of more than **3** (Figure 1).
- Poland's per-capita domestic extraction (DE) and domestic material consumption (DMC) increased at a rate similar to the G20 average (**+20%**) and remained above the G20 average (Figure 2). Poland's per-capita material footprint (MF) **more than doubled** and exceeded the level of the G20 average by **50%** in 2015. This increase was almost exclusively attributed to non-metallic minerals, which increased by more than a factor of **7** (Figure 7).
- Despite doubling its material footprint, Poland's material-related climate change and particulate-matter (PM) health impacts have decreased in both perspectives (Figure 1). On the one hand, this is because non-metallic minerals drove the increasing material footprint, but caused comparably low environmental impacts (Figure 3). On the other hand, this points to technology improvements for both domestically produced and imported materials (imports mainly came from the EU).
  Poland achieved absolute decoupling of its material-related climate change and PM health footprints (Figure 1).
- Poland's water stress footprints have **more than doubled** over the past two decades (Figure 1) due to doubling of food imports (Figure 7). Despite this increase, Poland's per-capita water stress footprint was still **less than half** of the G20 average (Figure 5).
- Increased labor efficiency in the agricultural sector and increased food imports have decreased the fraction of Poland's population working in the agricultural sector (**-33%** , Figure 1). Nevertheless, the value added created in Poland's material sectors increased by a factor of **3** (Figure 1).

Contribution of Natural Resources by Category

Figure 3: Contribution of resource types to domestic extraction, material footprint, and total environmental and socio-economic impacts in Poland (2015)



*Remaining economy refers to activities other than resource extraction and processing (e.g. manufacturing of finished products, construction).
Source: IRP database, Exiobase v3.4, Cabernard et al. 2019

- Non-metallic minerals such as sand and gravel contributed the most to domestic extraction amounts (43%) and material footprint (54%), but were responsible for a minor share of environmental impacts (≤5% for all impact categories, Figure 3).
- The extraction and processing of resources contributed to ~30% of climate change impacts from both perspectives (Figure 3).
- Outdoor PM related health impacts were mainly caused by the remaining economy (36%) and households (>45%) in both perspectives (Figure 3). For the latter, (outdated) coal heating systems and private mobility contributed the most.
- Water stress and land use-related biodiversity impacts were caused mainly by biomass production in both perspectives (Figure 5 and 6).
- The biomass sector contributed a minor share to value added (10%), although more than 20% of Poland's workforce was employed for biomass production (Figure 3).

Glossary

Material resources:
- metals,
- non-metallic minerals,
- biomass,
- fossils

Material-related impacts: Environmental impacts and socio- economic benefits (value added, workforce) related to the extraction and processing of material resources (including the upstream supply chain, such as electricity generation and transport.

Production perspective: The production perspective allocates the use of natural resources or the impacts related to natural resource extraction and processing to the location where they physically occur.

Consumption perspective: The consumption perspective allocates the use of natural resources or the related impacts throughout the supply chain to the region where these resources, incorporated into various commodities, are finally consumed by industries, governments and households. It equals the domestic impacts plus impacts of imports minus impacts of exports.

Decoupling: Decoupling is when resource use or some environmental pressure either grows at a slower rate than the economic activity that is causing it (relative decoupling) or declines while the economic activity continues to grow (absolute decoupling).

Net traded materials/impacts: Difference between material-related impacts from a production and consumption perspective. In the case of environmental impacts, a positive value means that the material-related impacts from exports are greater than the impacts from imports (and vice-versa: environmental impacts with negative values mean that the material-related impacts from imports are greater than the impacts from exports).

Domestic extraction (DE): Direct, gross physical extraction of materials within a country's territory (production perspective).

Domestic material consumption (DMC): Amount of materials directly used by an economy (DMC = DE + Material Imports – Material Exports).

Material footprint (MF): A nation's MF fully accounts for material extraction in other countries used for local consumption in the nation of interest (consumption perspective).

Material intensity (MI): Indicates efficiency of material use (MI = DMC / GDP)

Key Sectors and Resources

Figure 4: Climate change impacts from material sectors in the Poland (1995-2015)*

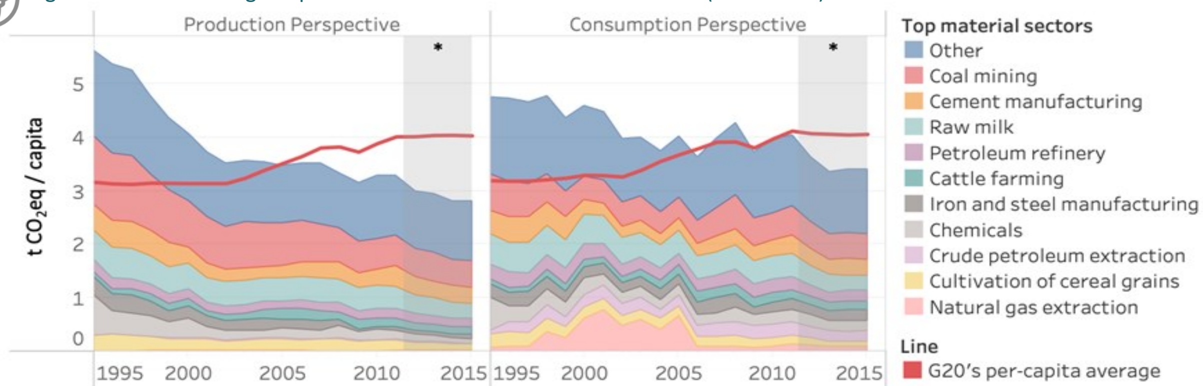


Figure 5: Water stress from agricultural crop and material sectors in Poland (1995-2015)*

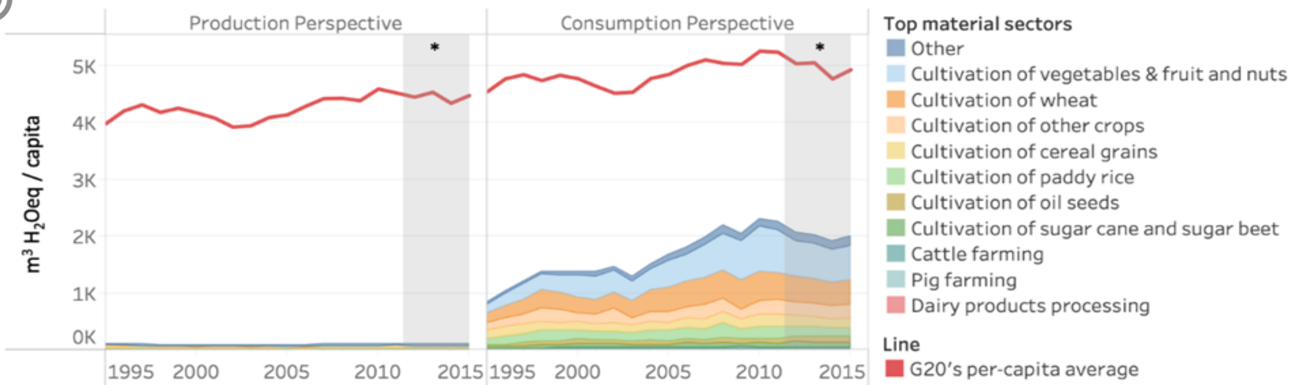
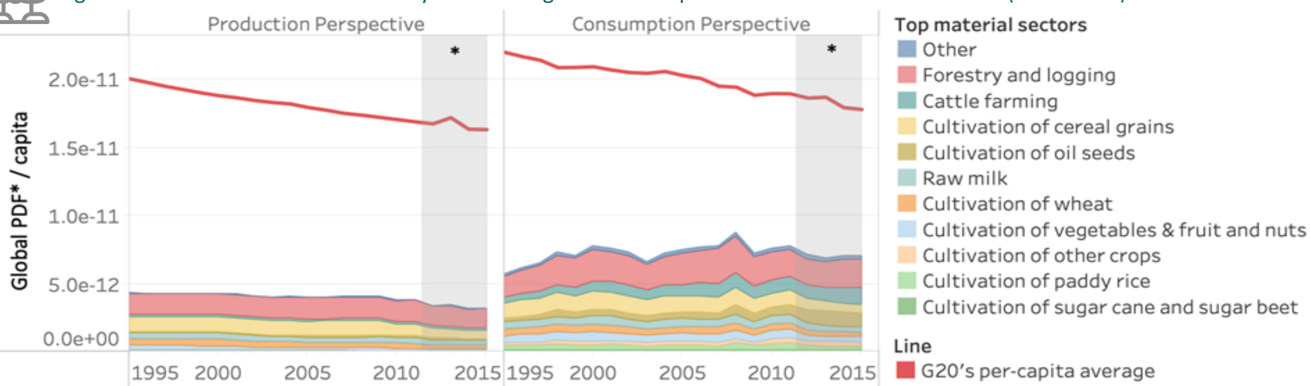


Figure 6: Land-use related biodiversity loss from agricultural crops and material sectors in Poland (1995-2015)*



***PDF: Potentially disappeared fraction**

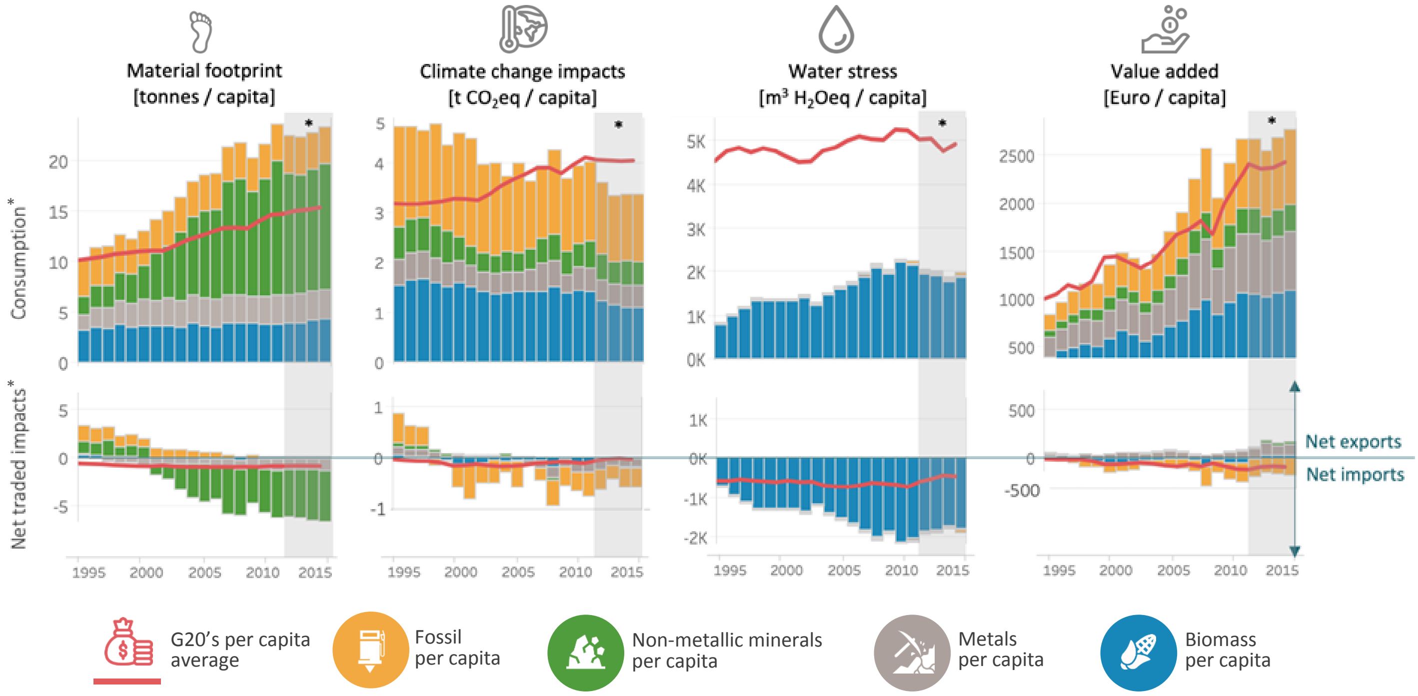
Source: IRP database, Exiobase v3.4, Cabernard et al. 2019 (Figure 4, 5, and 6).

***Years from 2012–2015 are now-casted and thus underly a higher uncertainty**

- More than half of Poland's material-related climate change impacts were caused by coal, petroleum, cement, chemicals, iron and steel, raw milk and cattle farming in both perspectives (year 2015, Figure 4).
- Material-related climate change impacts were 20% higher in the consumption than in the production perspective in 2015 (Figure 4). This was mainly attributed to the reduction of domestic emissions of coal mining, chemicals, iron and steel production (Figure 4).
- 70% of Poland's material-related climate change impacts are attributed to food consumption, heating and private transport by households. (Year 2015, data not shown here).
- Minerals were mainly used in the construction sector, electronics, and in the machinery and automobile industry. These end-sectors were responsible for 23% of material-related climate change impacts (14% construction, 5% electrics and electronics, 4% automobile industry; Year 2015, data not shown here).
- Domestic water stress was not a relevant issue. Impacts of water stress and land-use related biodiversity loss were higher in the consumption perspective than in the production perspective, but still at a very low level compared to other European countries and the G20 average. From a consumption perspective, half of Poland's water stress footprint was caused by the cultivation of vegetables, fruits, nuts and wheat (Figure 5).
- Land-use related biodiversity loss was less than half of the G20 average in both perspectives (Figure 6). Forestry, logging, cattle farming, raw milk, and the cultivation of cereal grains were responsible for more than 60% of Poland's land-use related biodiversity loss in both perspectives.
- The consumption of animal products was responsible for 20% of material-related climate change impacts, 15% of water stress, and 30% of land-use related biodiversity loss (Year 2015, data not shown here).

The environmental effects of trade

Figure 7: Per-capita consumption footprints (above) and net traded impacts (below) in Poland (1995-2015)*



**Consumption:* Impacts throughout the supply chain from goods imported and consumed in Poland.

**Net traded impacts:* Difference between material-related impacts from a production and consumption perspective.

Source: IRP database, Exiobase v3.4, Cabernard et al. 2019

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Poland has been a net importer of non-metallic minerals since 2001. The climate change impacts related to Poland's non-metallic mineral imports were insignificant.

Since 2000, more climate change impacts were caused by Poland's fuel and metal imports than by its exports.

Poland's water stress footprint (consumption perspective) was almost exclusively attributed to food imports.

Value added for traded metals was higher within Poland than outside. This indicates that rather cheap raw metals were imported, while more expensive processed metals were exported.

Future trends and potential Decoupling

- Poland's material-related climate change impacts are comparable to G20 average, but there is further potential to lower the climate change impacts by lowering the dependence on coal and shifting to renewable energy (e.g. wind, water, solar).

- Investments in the housing sector should be guided by principles of material efficient construction and urban design (e.g. substitution of high-impact materials like cement) to reverse Poland's trend of increasing material footprint and decrease material-related environmental impacts. This also includes resource- efficient building restoration.

- A shift to a sustainable consumer behavior can further lower Poland's per capita impacts. This includes replacing outdated fossil heating systems (particularly coal) and energy-efficiency increases in the housing sector (e.g. through insulation), a shift from private fossil-based cars (with partially outdated technology) to shared mobility and public transport, reduced consumption of animal products (particularly dairy products and beef) and minimization of food waste.

This factsheet is based on research completed by the International Resource Panel for the report "Global Resources Outlook 2019: Natural Resources for the Future We Want." The data analysis and text was prepared by Livia Cabernard, Stephan Pfister, Stefanie Hellweg (ETH Zurich), and Maria Jose Baptista (UNEP) with inputs from Victor Valido (UNEP), Yingying Lu and Heinz Schandl (CSIRO). The layout and infographics were designed by Yi-Ann Chen. Icons used are from Freepik.

International Resource Panel

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