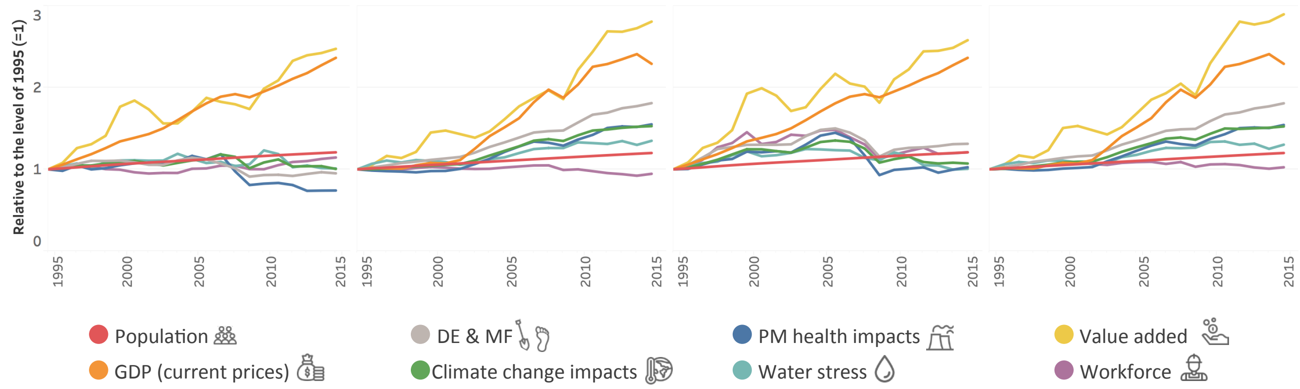
NATURAL RESOURCE USE IN THE GROUP OF 20

Status, Trends, and Solutions — USA

STATUS AND TRENDS OF NATURAL RESOURCE USE

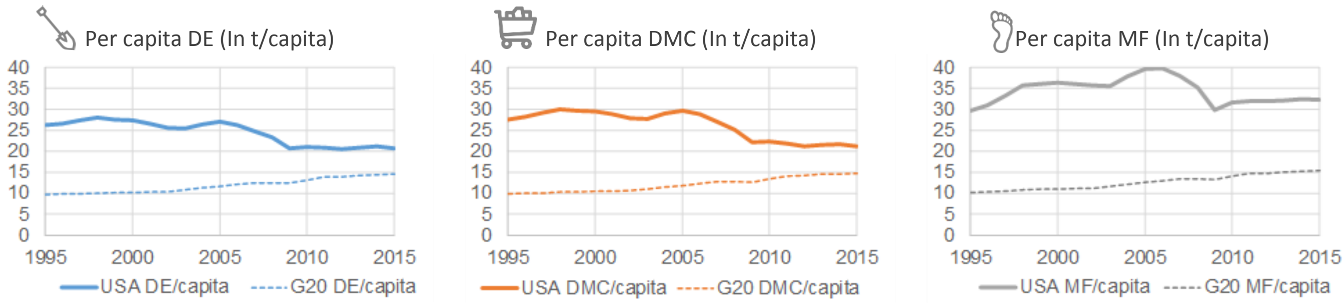
Figure 1: Socio-economic indicators, domestic extraction, material footprint, and material-related environmental impacts in the USA and in the G20 (1995-2015)*

See glossary on pages 2 and 3



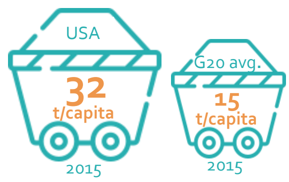
*Data after 2011 was nowcasted.
Source: IRP database, Exiobase v3.4 and Cabernard et al. 2019

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



Source: IRP database

From 1995 to 2015



Population grew by **21%** and GDP more than **doubled**.

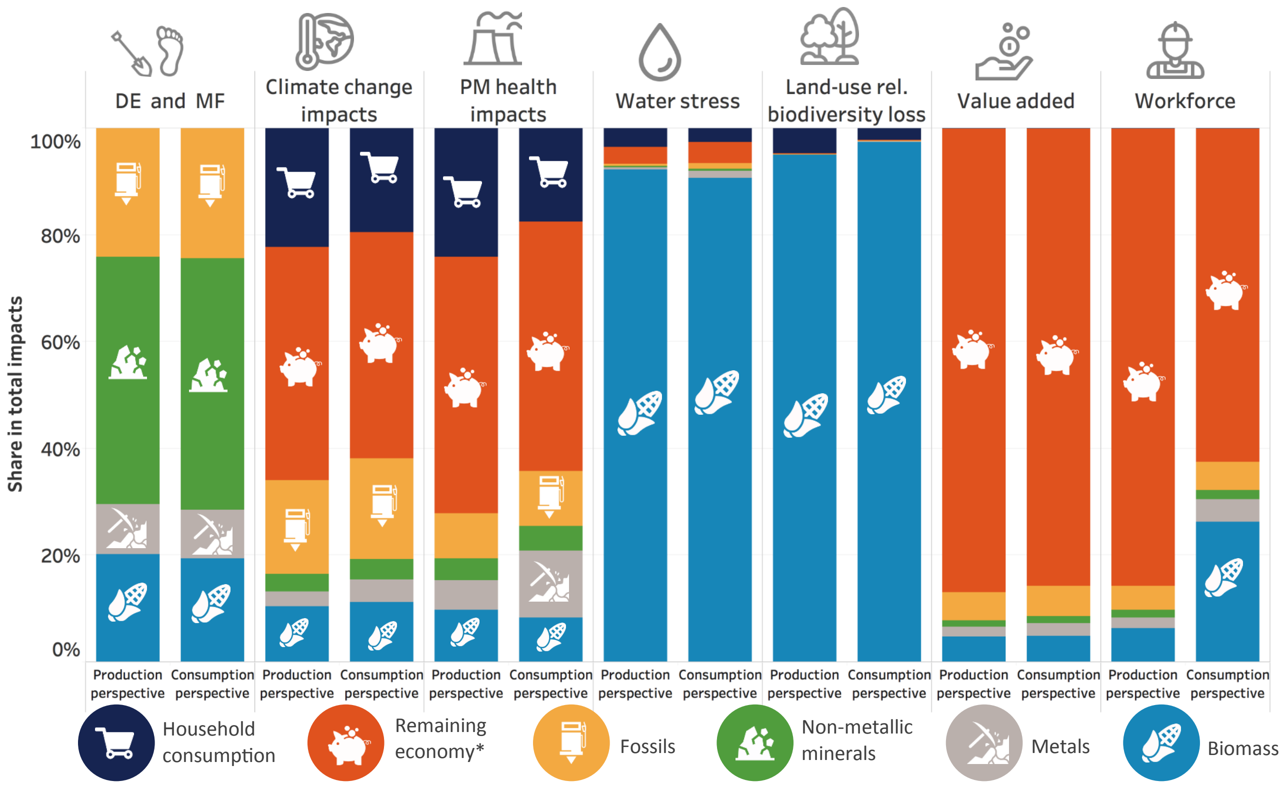
Material footprint increased from **30** tonnes/capita in 1995 to **40** t/capita in 2007 and then dropped again to **32** t/capita (G20 average was at 15 tonnes/capita in 2015).

This slight overall increase occurred in the supply chain of imported products, while domestic extraction and domestic consumption of materials decreased.

Per-capita climate change and water stress impacts related to material extraction and processing slightly decreased, but the absolute level remained above G20 average (more than **double** the G20 average impacts for climate change and **1/3** higher for water stress, from a consumption perspective).

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 the USA (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

In line with G20 average, non-metallic minerals like sand and gravel dominated the share of domestic extraction amounts and material footprint, but contributed to only a minor share of environmental impacts.

The extraction and processing of natural resources accounted for up to 40% of USA's total climate change impacts from both a production and consumption perspective (the G20 average was approximately 50% from both perspectives).

In line with other G20 countries, USA's water stress and land use-related biodiversity impacts were caused mainly by biomass production.

Outdoor particulate matter (PM) related health impacts mainly came from the remaining economy (e.g. fossil electricity and transport).

The material sector contributed to a minor share of value added as well as domestic jobs (both less than 20%) and relied on low-income workforce in agriculture outside of USA for food imports.

In general, for all indicators but workforce, the share related to material extraction and processing from a consumption perspective was comparable to the share related to material extraction and processing from a production perspective.

Glossary

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 in various commodities, are finally consumed by industries, governments and households

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)

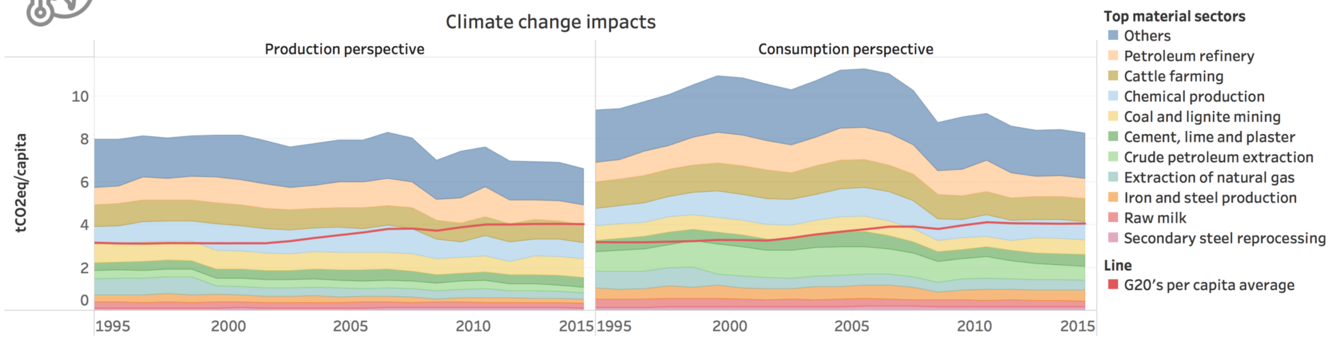
Domestic extraction (DE): Direct, gross physical extraction of materials within a country's territory (production perspective)

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

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

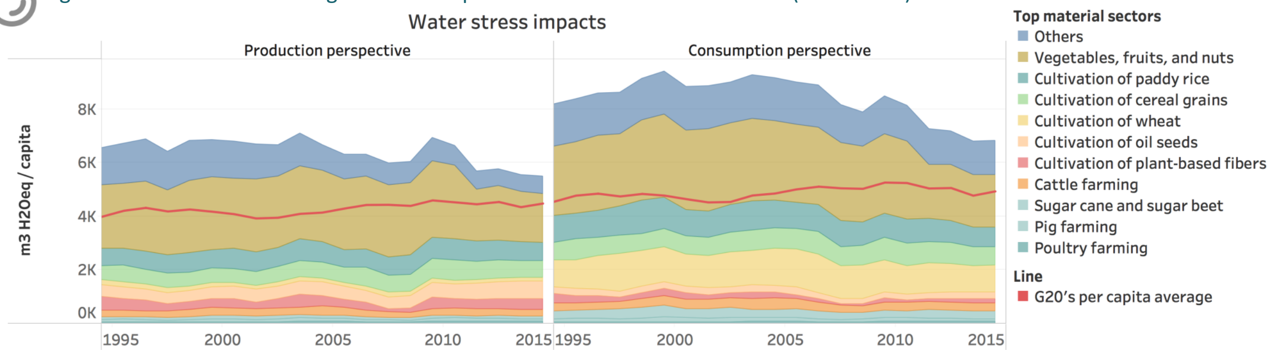
Key Sectors and Resources

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



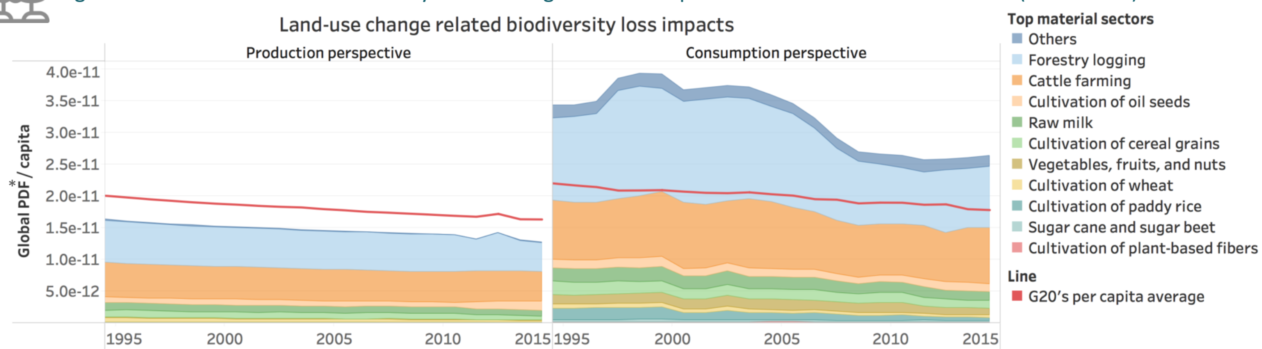
*Data after 2011 was nowcasted.
Source: IRP database, Exiobase v3.4, Cabernard et al. 2019

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



*Data after 2011 was nowcasted.
Source: IRP database, Exiobase v3.4, Cabernard et al. 2019

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



*Data after 2011 was nowcasted.
**PDF:* Potentially disappeared fraction of species
Source: IRP database, Exiobase v3.4, Cabernard et al. 2019

- Material-related climate change impacts were mainly caused by the refining of petroleum, chemical production, coal mining, cattle farming, and extraction of crude oil and natural gas.
- Climate change impacts decreased slightly, but remained much higher than the G20 average (in 2015 double from a consumption perspective).
- Materials with large climate impacts (oil, fossil fuels including natural gas) are often directly consumed by households especially for mobility, heating and food (particularly beef).
- Major industrial sectors using climate-intensive materials are construction and motor vehicle manufacturing.
- Water stress is dominated by agricultural activities, such as the production of vegetables, fruits, nuts, paddy rice, corn and other cereals, oil seeds and additionally wheat from a consumption perspective.
- Water stress is higher than the G20 average from both a production and consumption perspective.
- From a production perspective, land use-related biodiversity loss is slightly lower than the G20 average. However, from a consumption perspective, land use-related biodiversity loss, is higher than the G20 average due to imports of wood and beef from regions with high ecological value.

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)

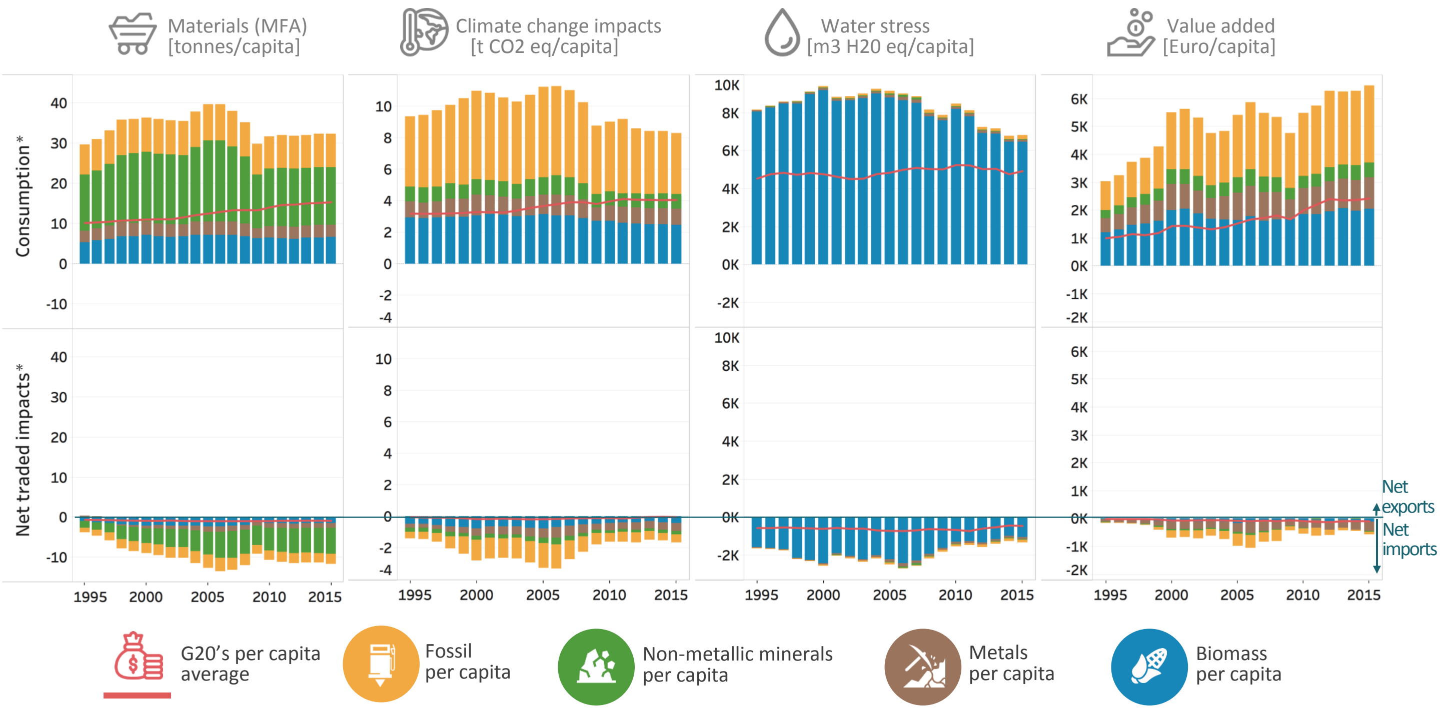
Material-related impacts: Impacts related to the extraction and processing of material resources (including the upstream supply chain, such as electricity generation and transport)

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)

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

The environmental effects of trade

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



*Data after 2011 was nowcasted.

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

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

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

- USA is a net importer of all material types (with significantly higher levels of trade activity than the G20 average). Accordingly, more environmental impacts are caused outside of USA from material imports than within its borders (from material exports).
- Nevertheless, the majority of material related impacts caused by US consumption occur within the country (see magnitude of bars in upper and lower graphs) – except for land use.
- For all material types, net value added was higher outside of the USA than inside.

Future trends and potential Decoupling

- Scenarios developed by the IRP forecast an increase of GDP by more than a factor of 2 and a population growth of +30% until 2060.
- If ambitious resource efficiency policies are introduced, USA could see an absolute decoupling of domestic material extraction and domestic material consumption from GDP until 2060.
- Per-capita material-related environmental impacts have slightly decreased in the past two decades. However, material footprint and all environmental impacts per capita remain much higher than the G20 average. Resource efficiency strategies along the entire supply chain like phasing out outdated technologies, material efficient design, and clean energy could help decrease these impacts.

This factsheet from the International Resource Panel, was prepared in cooperation with the Ministry of Environment of Japan and the Institute for Global Environmental Strategies, as a contribution to the G20 Resource Efficiency Dialogue 2019 in Japan. The document is based on research completed by the IRP for the report "Global Resources Outlook 2019: Natural Resources for the Future We Want." The data analysis and text for the G20 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 with support from Qinhan Zhu on figure layout. Icons used are from Freepik.