



# Material flow indicators in the SDGs

Joint Task Force on Environmental Statistics and Indicators

Geneva, 30 June 2017

Dr. Stephan Lutter

# Content

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1. Material Flow Analysis (MFA):  
methodology & assessment
2. Implications for policy making
3. Future research and conclusions

# Content

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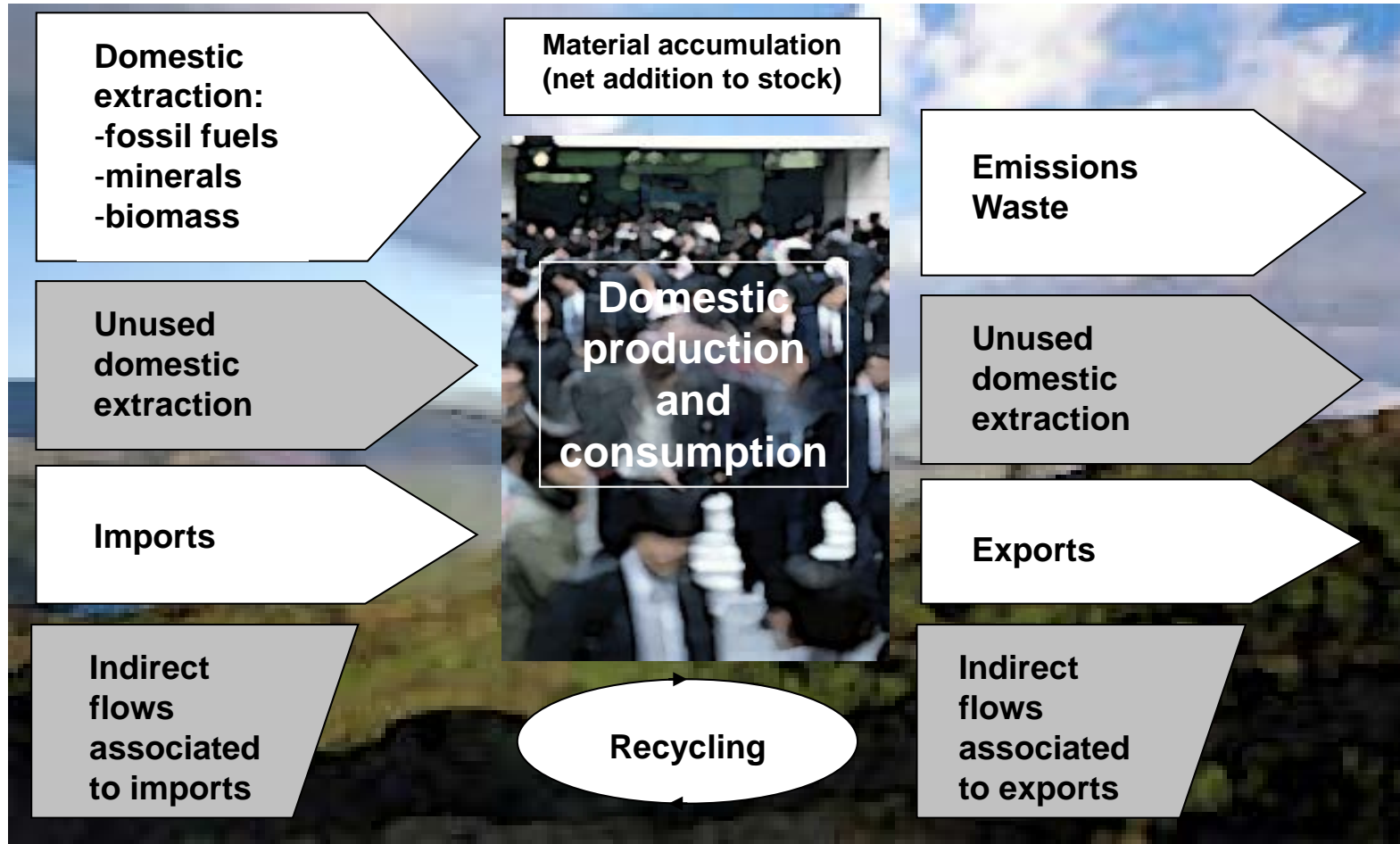
- 1. Material Flow Analysis (MFA):  
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# Material Flow Analysis (MFA)

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- Analytical method to quantify flows and stocks of materials or substances in a well-defined system
- Tool to assess the physical consequences of human activities and needs
- Main assumption: every extraction or movement of material is an intervention in natural system with negative consequences.
- Material use as proxy for negative impacts of human activities

# Material Flow Analysis (MFA)



# MFA indicators for extraction and consumption

Low  
uncertainty

Domestic Extraction (DE)

Extraction within a country



Domestic Material Consumption (DMC)

DE + direct Imports – direct Exports



Raw Material Consumption (RMC) = "Material Footprint"

Higher  
uncertainty

DMC + raw material equivalents of imports – RME of exports

Good  
availability



Limited  
availability

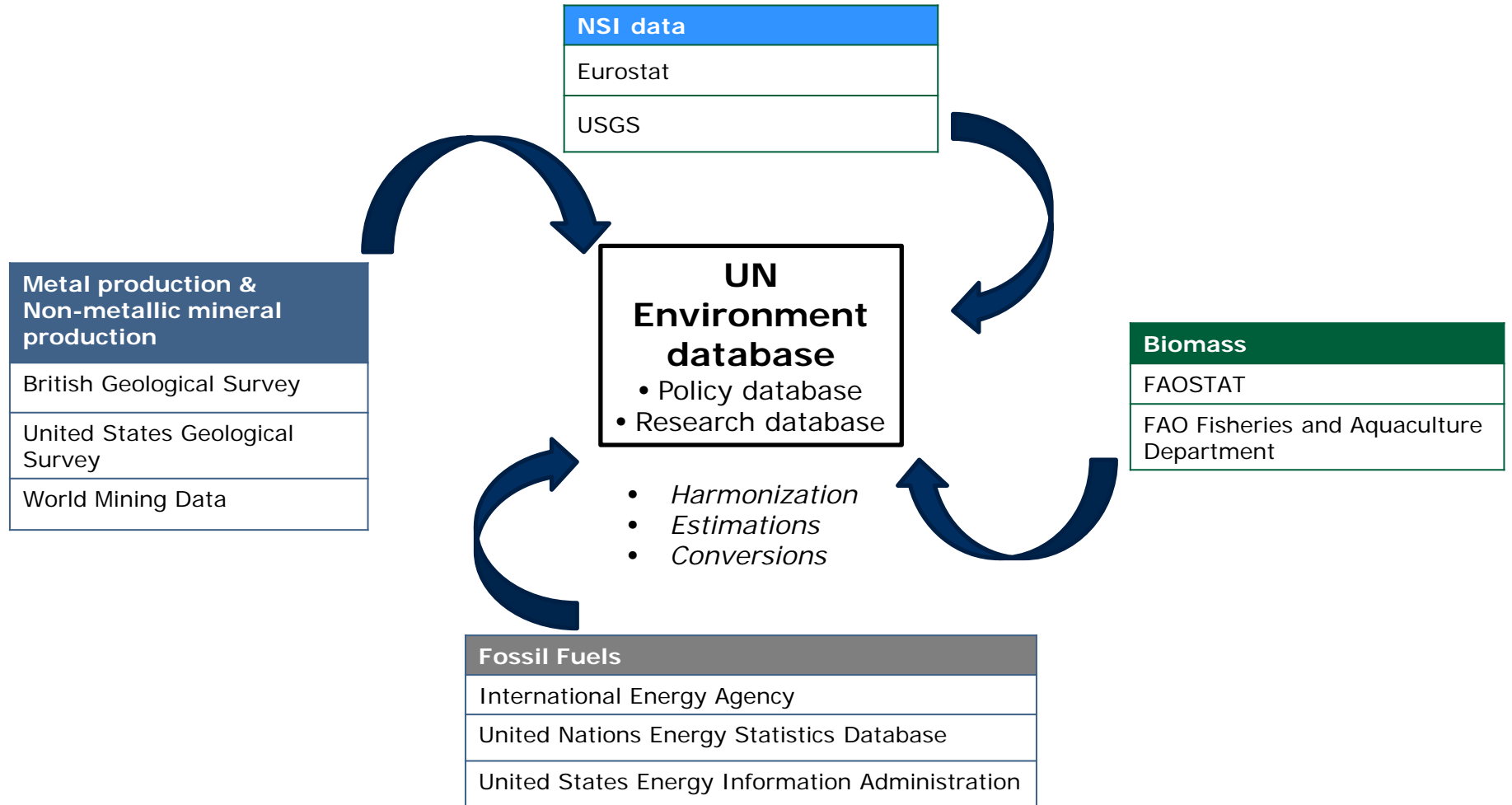
# MFA data sources

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## UN Environment database

- Aim: to provide one harmonised global reference dataset on material extraction and trade
- For use by wide range of stakeholders, e.g. policy makers, civil society organisations, scientists
- Coverage:
  - 191 countries
  - 1970-2017
  - Policy database: 13 material categories
  - Research database: 64 material categories
  - Biomass, metal ores, minerals, fossil fuels (reported in tonnes)
- Authors: CSIRO & WU Vienna

# MFA data sources





# MFA data sources

The screenshot shows the UNEP Live website interface. At the top left, the logo reads "environment live". The main navigation bar includes "Science and data for people" and a list of links: "Assessments", "World Data", "Sustainable Development Goals", "Get Involved", and "Log in". A search bar with a magnifying glass icon is positioned below the navigation. The main content area features four vertical panels: "ASSESSMENTS" with a wind turbine image and a book icon; "WORLD DATA" with a cityscape image, a dropdown menu labeled "SELECT COUNTRY/REGION/GLOBAL", and a "DATA DOWNLOADER" button with a download icon; "SUSTAINABLE DEVELOPMENT GOALS" with a circular SDG wheel icon; and "GET INVOLVED" with an image of hands holding a plant and a circular icon of people. The footer contains the "UN environment" logo and copyright information: "Copyright © United Nations Environment | Privacy Notice | Terms of Use | Site Map | Feedback".

# MFA data sources

environment live  
Science and data for people | Assessments | World Data | Sustainable Development Goals | Get Involved | Log in | Select Language

Search Data Downloader

Data downloader

Note: Click on the headings to expand or collapse the panels.

Popular indicator downloads (non-spatial data)

- All
- Poverty
- Food Security
- Health and Well-being
- Education
- Gender
- Water and Sanitation
- Energy
- Employment
- Industry
- Inequalities
- Cities and Communities
- Consumption and Production
- Chemicals, wastes and air quality
  - Average compliance rate
- Resource efficiency**
  - Domestic material consumption (Total)
  - Material Footprint (Total)
  - Material Footprint (Total)
  - Material Footprint (Total) per capita
- Emissions and climate change reporting
  - Mortality rate - unintentional poisonings (per 100,000 population)
- Agricultural productivity
  - Agricultural area irrigated
  - Agricultural area, % land
  - Agricultural area, hectares
  - Agriculture production index
  - Agriculture value added per worker
- Climate Change
- Oceans and Coastal environment
- Land
- Peace
- Partnerships and Financing

Countries

- All countries (Option only available for downloads - download may take some time when download was in target)
- Afghanistan
- Albania
- Algeria
- Andorra

Regions

- All regions (Option only available for downloads - download may take some time when download was in target)
- Africa
- Asia and the Pacific
- Central Asia
- Europe

SDG Regions

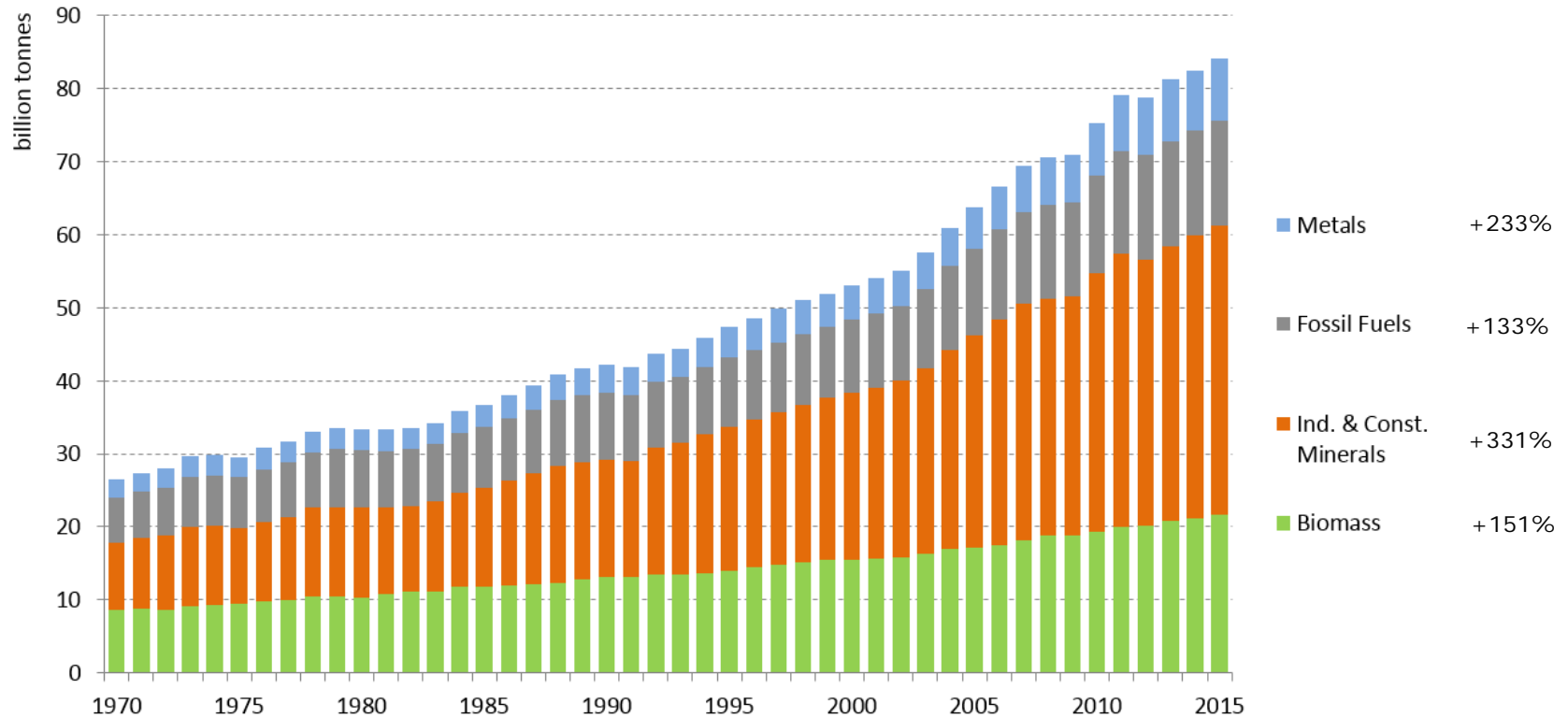
- SDG regions (Option only available for downloads - download may take some time when download was in target)
- Landlocked Developing Countries (LDCs)
- Least Developed Countries (LDC)
- IM3 group: Australia and New Zealand
- IM3 group: Central Asia and Southern Asia

Submit

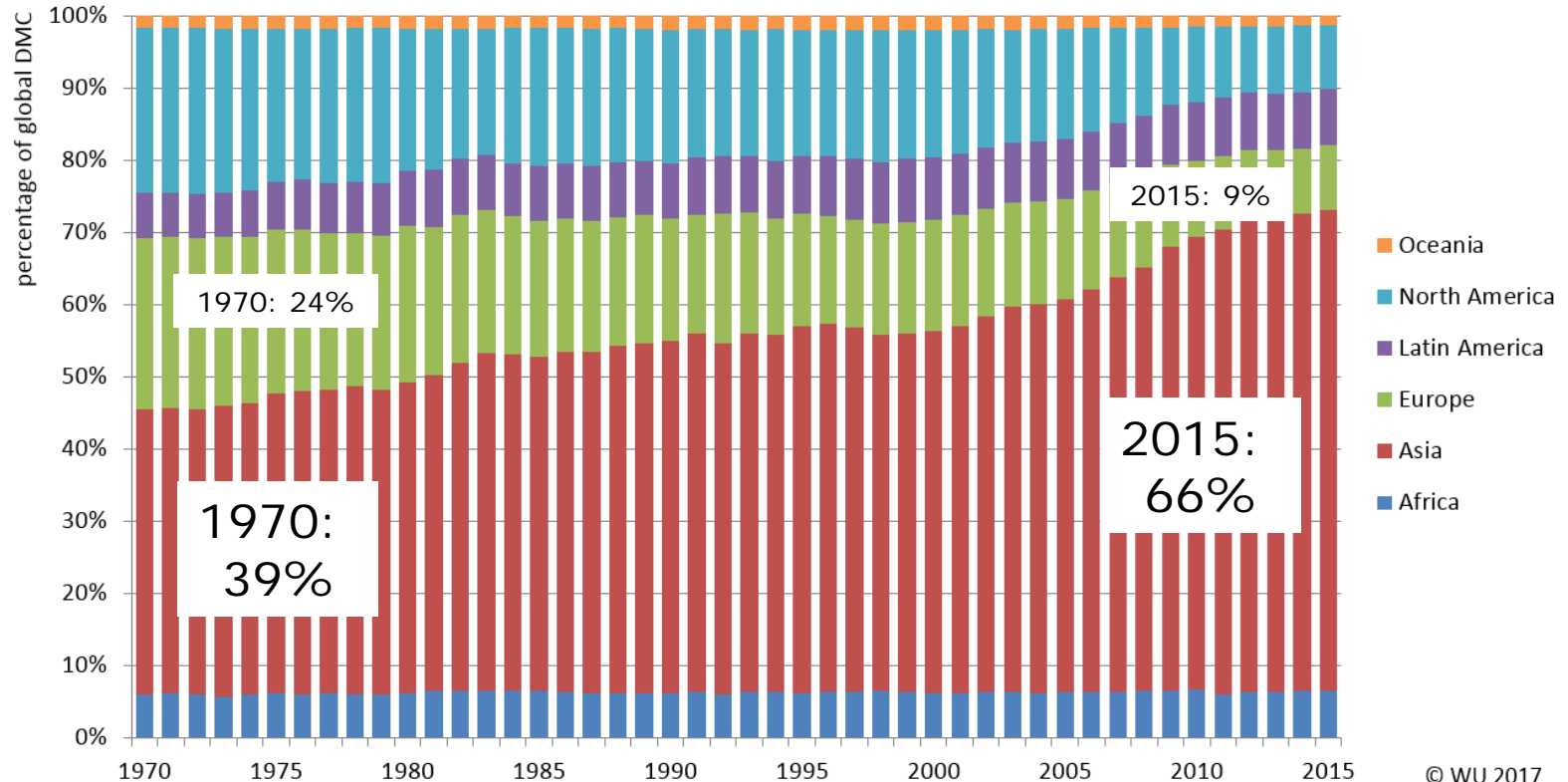
## Resource efficiency

- Domestic material consumption (Total)
- Material Footprint (Total)
- Material Footprint (Total)
- Material Footprint (Total) per capita

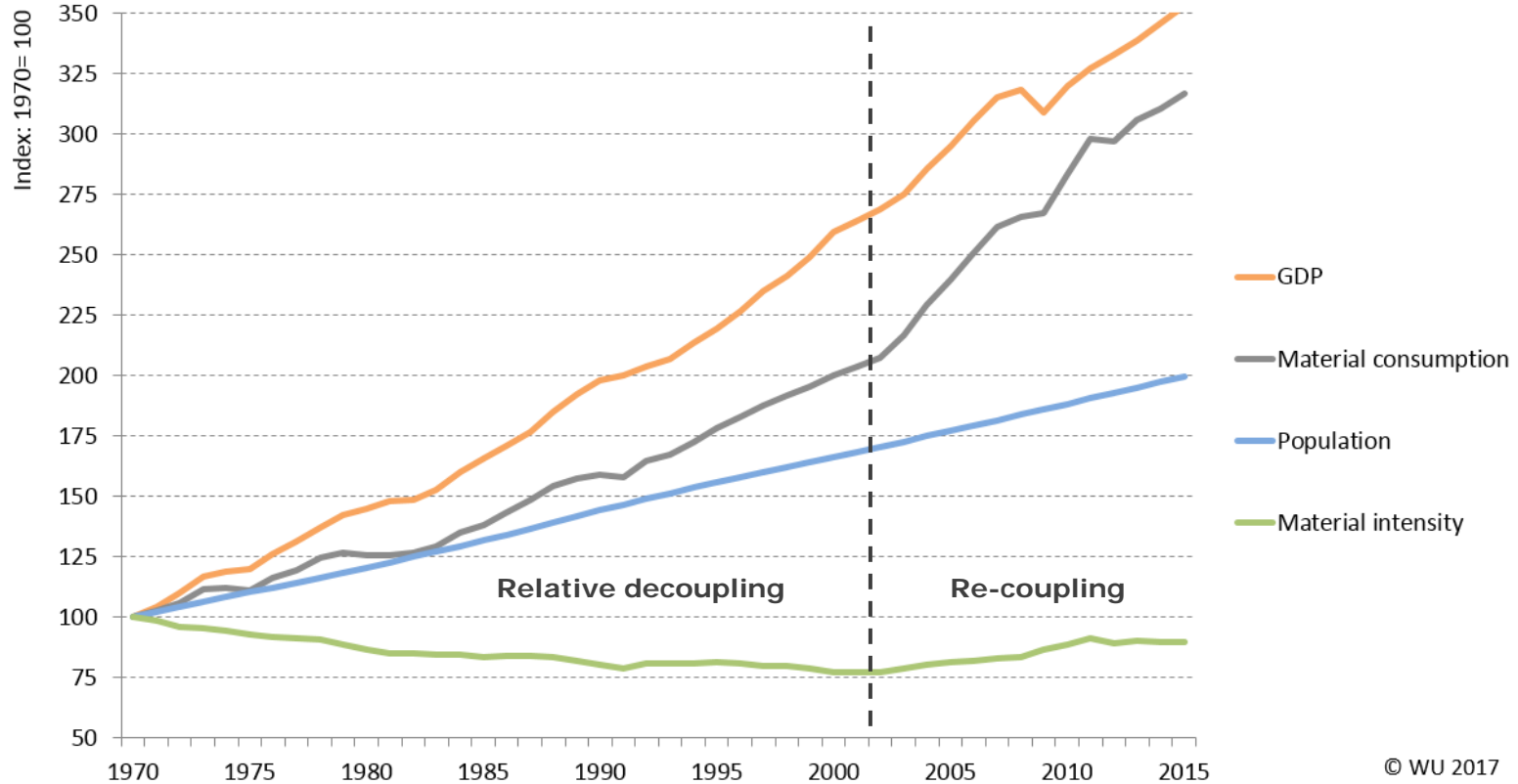
# Increasing global material consumption



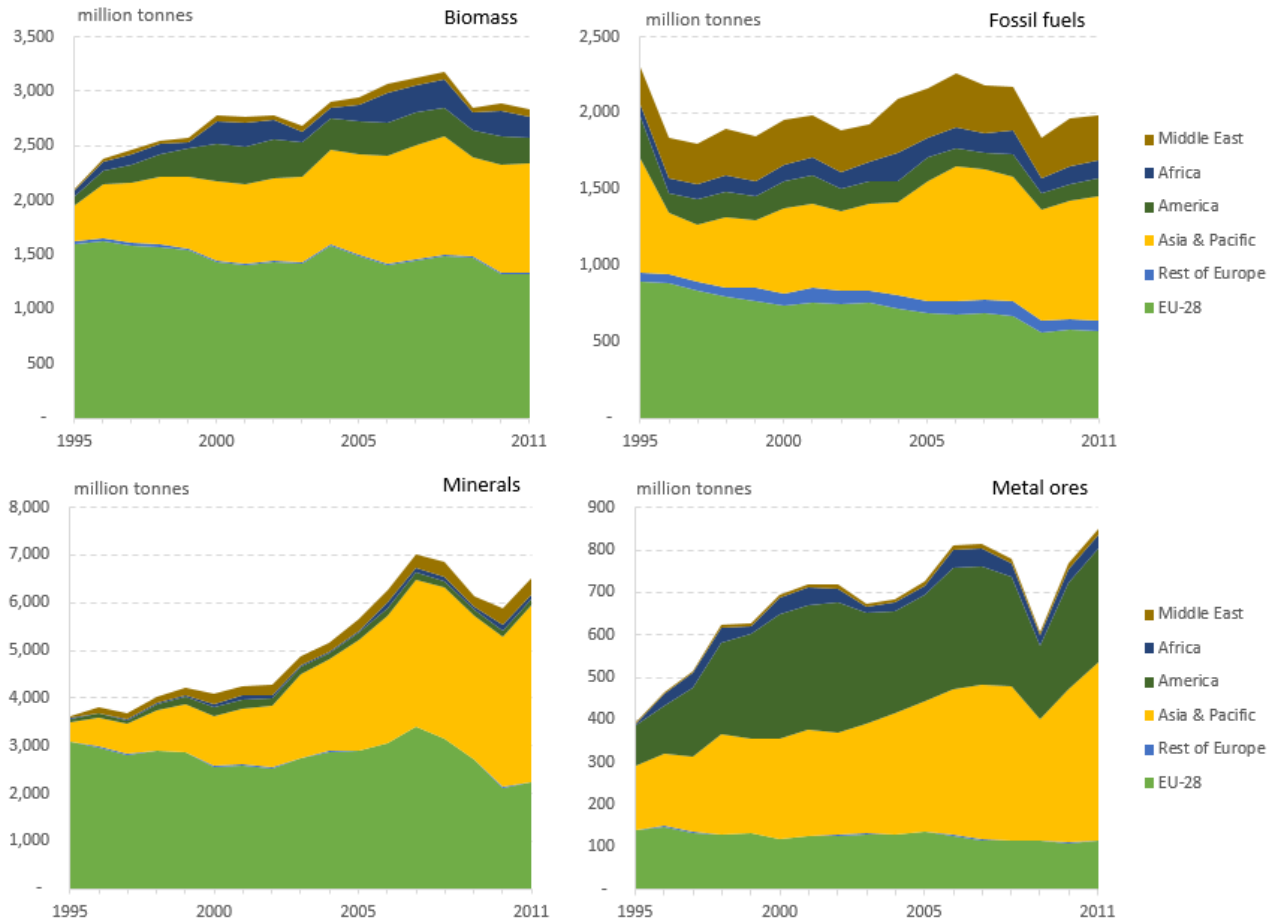
# Growing role of emerging economies



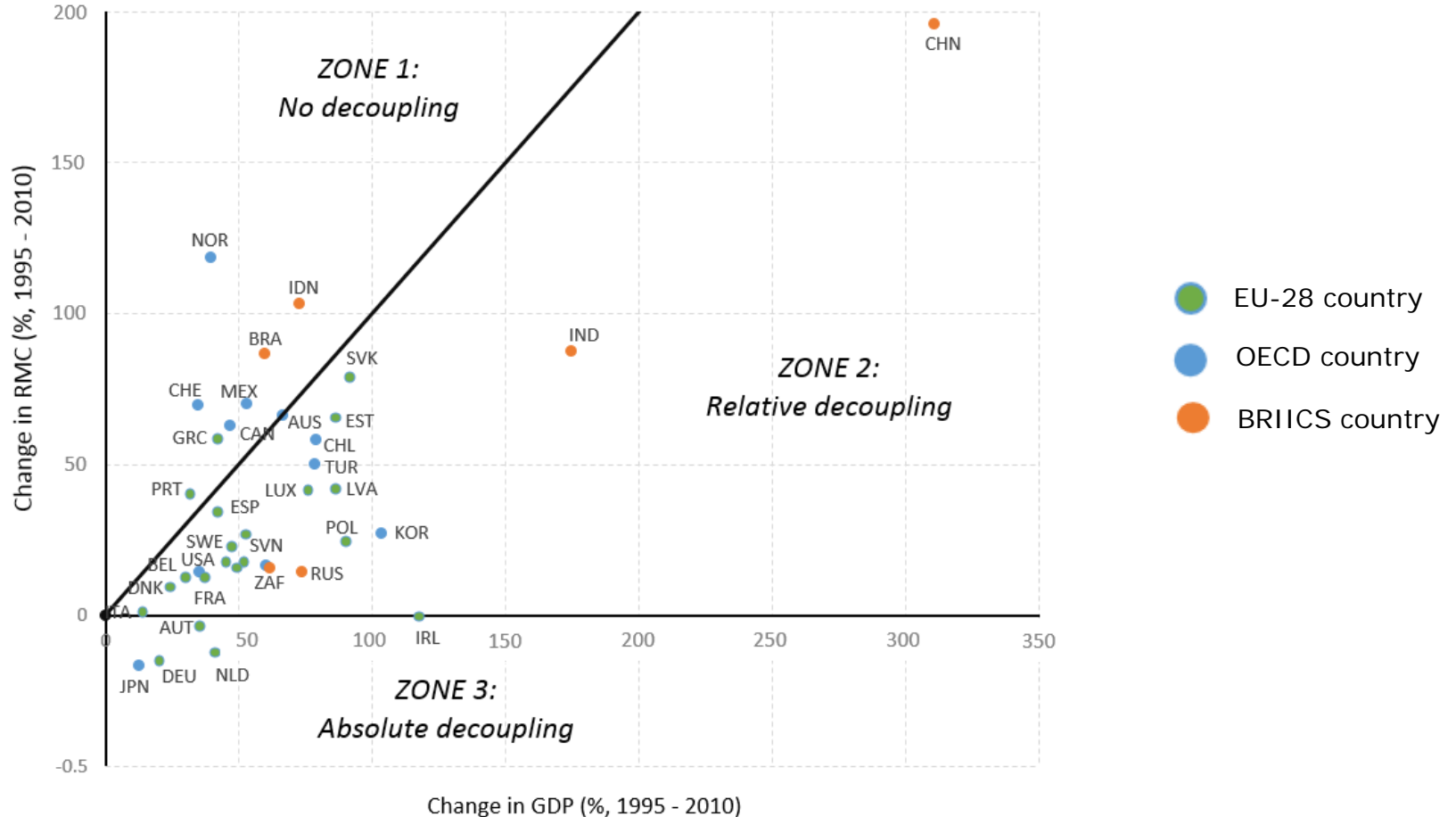
# Re-coupling of material consumption and economic growth



# Geographical origin of EU-28 material footprint (MF)



# Decoupling of material footprint from economic growth



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# MFA indicators and their policy relevance (selection)

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Indicator	Analysis
DE	Environmental pressures due to material extraction - trends
DMI/DMC	Local pressures due to material use within a specific economic system; dependence on direct imports
RMI/RMC	Resource requirements along supply chains – outsourcing of resource extraction and related impacts; dependence on direct and indirect imports
GDP/DMC	How much economic value is created per direct material input; has decoupling been reached
GDP/RMC	How much economic value is created per material input along supply chains; has decoupling been reached

DE ... Domestic Extraction; DMI ... Domestic Material Input; DMC ... Domestic Material Consumption  
RMI ... Raw Material Inputs; RMC ... Raw Material Consumption („Material Footprint“)

# Resource efficiency in the EU

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- Decoupling efforts need to be intensified → policy mix of micro- and macro-economic measures
  - Roadmap to a resource-efficient Europe
  - Circular economy action plan
- ‘Hot-spot’ sectors and product groups
- Increasing complexity of supply chains: growing fraction of materials being extracted outside Europe
- Service sectors: contribute ~25% to EU material footprint

# Resource efficiency in international policy debates

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- UN 2030 Agenda for SD: “*sustainable natural resource use is a necessary condition to achieve a better future for current and future generations*”
  - SDG 8 (economic growth): target 8.4: continuously improve resource efficiency of production and consumption over time
  - SDG 12 (SCP): target 12.2: by 2030 achieve sustainable management and efficient use of natural resources
- UNEP Green Economy, OECD Green Growth, G7 Resource Efficiency, EC Resource Efficiency Roadmap
  - Focus on decoupling economic growth from resource use

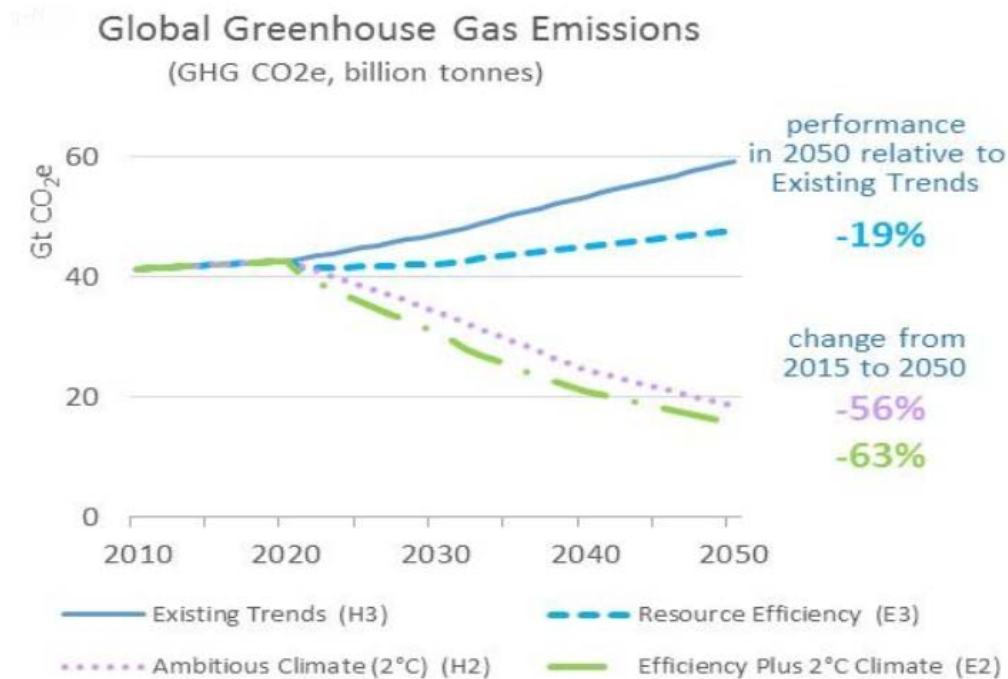
# Resource efficiency in China

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- China's circular economy "promotion law" (2008): three main targets
  - decouple economic growth from resource consumption and pollutants
  - shift from a narrow vision of solid waste treatment to the idea of closed-loop material flows
  - facilitate the development of the circular economy at national, provincial, municipal and county levels
  - introducing policies and instruments for controlling the total quantities of resource consumption and pollutant discharge, e.g. extending manufacturers' product responsibilities

# Using synergies

- Increase in resource efficiency is key for meeting climate change targets cost effectively



Source: UNEP, 2016

# Content

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# Improving the global data availability

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- MFA data collection:
  - UN Environment MFA Manual – 2017/2018
- MFA data provision:
  - UN Environment global MFA database – regular updates
- Material Footprint modelling:
  - Eurostat/NSIs
    - Modelling for EU-28
    - Guidelines for Member States
  - OECD
    - Steering international harmonisation process
    - Together with WU Vienna and UNEP IRP
    - Next workshop in September 2017

# Fine-scale footprints and related impacts

- ERC grant for Dr. Giljum and his team





# Conclusions

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- MFA data reporting obligatory in EU (Regulation (EU) No 691/2011) → Eurostat Manual
- Growing interest in solid indicators on material use and material footprints (e.g. SDGs, OECD, EU Circular Economy, ...)
- Improving resource efficiency helps in meeting climate goals
- MRIO models to assess global material flows are a rapidly evolving field → hot-spot sectors and supply chains, decoupling, import dependencies, etc.

# Thank you very much for your attention!

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VIENNA UNIVERSITY OF  
ECONOMICS AND BUSINESS

**Institute for Ecological Economics**

Welthandelsplatz 1, 1020 Vienna, Austria

**Dr. Stephan Lutter**

T +43-1-313 36-5754

[Stephan.lutter@wu.ac.at](mailto:Stephan.lutter@wu.ac.at)

[www.wu.ac.at](http://www.wu.ac.at)