



Assessing the environmental impacts of consumption and production:

PRIORITY PRODUCTS AND MATERIALS

All economic activity depends on inputs of energy, materials, and land. Economic activity also generates residuals, which enter the environment as waste or pollution. The Earth has a limited capability to supply resources and absorb pollution. A fundamental question faced by governments worldwide is how different economic activities influence the use of natural resources and the generation of pollution. The International Panel for Sustainable Resource Management is responding to this challenge with its assessment report: Assessing the environmental impacts of consumption and production: priority products and materials. This report is the result of extensive literature examination and review process, involving a number of experts, to provide a robust assessment of what economic activities have the highest impacts on the environment.

This report assesses the impacts of economic activities on the Earth's natural environment

- 1. Identification of the most critical uses of natural resources and impacts.** *Which key environmental and resource pressures need to be considered in the assessment of products and materials?*
- 2. Assessment from a production perspective.** *What are the main sectors contributing to environmental and resource pressures?* This perspective helps informing producers and policy makers where clean technologies are most needed.
- 3. Assessment from a final consumption perspective.** *Which consumption categories and product groups have the greatest environmental impacts across their life cycle?* This perspective helps to understand where shifts to low-impact products and sustainable life styles result in the biggest reduction of impacts.
- 4. Assessment from a resource and material use perspective.** *Which materials have the greatest environmental impact across their life cycles?* This perspective helps to understand where shifts in the material base of society can contribute to lower impacts.
- 5. Outlook and conclusions.** *Will expected socio-economic trends and developments make the current priorities more relevant and critical?* What are the overall conclusions with regard to the most relevant economic activities?

1. The most critical impacts are related to ecosystem health, human health and resource depletion. Of these, human health and environmental health impacts are best researched. Human health problems appear to be mainly a development issue.

- The Millennium Ecosystem Assessment (MEA) showed irreversible losses of ecosystems because of habitat change, nitrogen and phosphorus pollution, climate change, invasive species and overexploitation (with fisheries and forestry).
- The World Health Organisation's Burden of Disease study shows that most diseases are related to underdevelopment, such as malnutrition. Environmental factors such as lead exposure, urban air pollution, climate change, and occupational exposure to particulates and carcinogens cause a few percent of the burden of disease.
- On impacts related to resource depletion least consensus exists, particularly on the question whether scarcity will be solved by market forces.

2. From a production perspective, fossil fuel combusting processes, agriculture, and fisheries have the most important impacts.

- The combustion of fossil fuels for electrical utilities, residential heating, transportation and



energy intensive industries, are among the top contributors to climate change, abiotic resources depletion, and in some cases to eutrophication, acidification and toxicity.

- Agricultural activities and biomass-using activities are significant contributors to climate change, eutrophication, land use, water use and toxicity.
- Overexploitation and collapse of fish stocks is clearly associated with the fishery sector.

3. From a final consumption perspective, household consumption related to mobility, shelter, food and energy using products cause majority of life cycle impacts of consumption.

- In most countries household consumption determines 60 percent or more of the life cycle impacts of final consumption. Within household consumption, food and housing dominate contributions to climate change in developing countries. In developed countries shelter, mobility, food and manufactured products typically determine more than 70 percent of the impacts of household consumption.
- Government consumption and investment in infrastructure and capital goods have lower impacts than household consumption. An exception to this is when emerging economies are building up their infrastructure.
- Improved examination of the role of imports and exports is crucial. Emerging economies (particularly in Asia) export large amounts of products to developed countries. This shifts some of the impacts driven by consumption to the countries where production takes place.
- Impacts of consumption rise with higher wealth. Typically, a doubling in income leads to 80 percent higher CO₂ emissions.

4. From a material perspective, agricultural goods, biotic materials and fossil fuels are most relevant.

- Currently two main approaches are being used to prioritize materials. Material Flow Analysis (MFA) counts the mass of materials used. Impact based indicators such as the Environmentally weighted Material Consumption (EMC) add a weighting factor that reflects impacts per kg of material over the life cycle.
- Both types of indicators agree on the high importance of food products and fossil fuels. Impact based studies highlight the relative importance of animal products, as they indirectly use a large proportion of the world's crops, so there is a high

use of land. Construction materials only show up as relevant in indicators that count the mass of materials used. Such materials do not cause high impacts in their lifecycles.

- Many metals have a high impact per kilogram compared to other materials. In view of the comparative size of their flows, only iron, steel and aluminium enter the priority lists. In total, minerals are as important as plastics.

5. The combined conclusions from a production, consumption and materials perspective lead to a clear picture: food/agriculture and all processes involving fossil fuels have the highest relevance.

- Agriculture and food consumption are identified as one of the most important drivers of environmental pressures (habitat change, climate change, water use and toxic emissions).
- The use of fossil fuels for heating, transportation and the production of manufactured goods is of comparable importance (depletion of fossil energy resources, climate change, and various other impacts).
- The impacts related to these activities are unlikely to be reduced, but rather enhanced, in a business as usual scenario. Population and economic growth will lead to a higher demand for energy and food, and most probably a comparatively high demand for meat and dairy products which are the most environmentally intensive categories.

Further work is highly recommended

- There are many ways to reduce the environmental impacts of production and consumption in the priority areas identified, such as through changed consumption patterns or use of best available technology in production activities. Further studies identifying and assessing these options would help decision makers in moving towards sustainable resource management.
- It seems relevant to review existing scenario studies and if needed, to do new scenario work that explores potential new impacts and resource availability problems related to the transition to a green economy
- The conclusions of this report are based on a broad array of studies and hence can be seen as robust. Most of these studies however were done for different countries, using different approaches and data classifications. UNEP and other Organizations are recommended to explore practical collaborative efforts in harmonized data generation across countries.

A summary and the full report as well as a ppt presentation with the main findings can be downloaded at: www.unep.fr

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