CSI 038 - Domestic Material Consumption (DMC)

Rationale

Justification for indicator selection

The indicator provides a physical description of a national economy, complementing the greater detail offered by other common indicators (e.g. energy use, waste generation or air emissions). In economic terms, the indicator show the dependency on physical resources and the efficiency with which they are used by national economies. In environmental terms, the indicator can be used as a proxy for environmental pressures associated to resource extraction, the subsequent material transformation, and the final disposal of material residuals back to the environment. At all these stages, environmental pressures arise through the transformation of materials. For instance in the case of mining, the extracted primary resource material is transformed into a raw material good (e.g. fossil energy carrier, metal ore etc.) and residuals (e.g. air emissions, mining waste). During the next stage the raw material is going to be transformed into a basic material good (e.g. steel) which again may be further transformed to a final consumer good (e.g. motor vehicle), and each time further residuals in terms of emissions and wastes arise as by-products. In the end, after its use-phase, only emissions and wastes remain. Hence, sooner or later, all material inputs are transformed into residuals in form of emissions and wastes which are usually representing environmental pressures. Although different residuals arising from different material inputs may cause different impact potentials, there is also a quantitative aspect. The higher the material input, the higher the potential pressure. The indicator does not replace well-known specific environmental pressure indicators (e.g. Global Warming Potential, Acidification Potential etc.), rather, they are used in a complementary way to express the quantity dimension.

Reference to other indicator initiatives:

Economy-wide material flow accounts and derived indicators - A methodological guide
Eurostat, 2001, Luxembourg

Integrated Environmental and Economic Accounting 2003- Handbook on national accounting
United Nations, European Commission, IMF, OECD, World Bank, 2003. New York

Total material requirement of the European Union
European Environmental Agency; Bringezu, S.; Schuetz (2001): Total Material Requirement of the European Union. EEA. Copenhagen.

Indicator definition

Domestic Material Consumption (DMC) is an aggregate of all materials (without water and air) which are actually consumed by the economic processing of a national economy. DMC measures the input of materials which are directly used in the economy, that is, used domestic extraction and physical imports (mass weight of imported goods) minus the exports (mass weight of exported goods).

In economic terms, it is related to the consumption activities of the residents of a national economy. It is also the resource indicator closest related to the GDP. In environmental terms, DMC is a proxy for potential environmental pressures associated to the disposal of residual materials to the domestic environment.

(Domestic Material Consumption = Direct Material Input - Exports)

Units

1000 metric tonnes

Policy context

Context description

In the European Union, the issue of resource use has been put on the political agenda. The EU's Strategy for Sustainable Development emphasised the strategic objective to break the link between economic growth, the use of resources, and the generation of waste.

The 6th Environment Action Programme of the European Union identified Sustainable Use of Natural Resources and Management of Waste as one of its four priority areas. The specific objectives for this area are:

to ensure that the consumption of renewable and non-renewable resources does not exceed the carrying capacity of the environment; and

to achieve a de-coupling of resource use from economic growth, through significantly improved resource efficiency, dematerialisation of the economy, and waste prevention.

As part of the work plan, the Community is developing a 'Thematic Strategy on the Sustainable Use of Natural Resources.' Through the analysis, data collection and evaluation, the goal is to identify priority areas for policy intervention, as well as to propose best mix of policy instruments to address the identified issues.

The issue of consumption and production patterns was addressed for the first time as a policy matter during the United Nations Summit on Environment and Development in Rio 1992. It was then recognised that the current consumption and production patterns, particularly those in the developed economies, were unsustainable and had to be changed. One promising approach was to increase the resource-efficiency of economic activities and processes, i.e., to produce more welfare with less associated use of resources.

The importance of the issue was confirmed ten years later, in August 2002, during the World Summit on Sustainable Development in Johannesburg. It was decided to establish a ten-year Framework Programme to "accelerate the shift towards sustainable consumption and production to promote social and economic development within the carrying capacity of ecosystems by addressing and, where appropriate, de-linking economic growth and environmental degradation, through improving efficiency and sustainability in the use of resources and production processes, and reducing resource degradation, pollution and waste" (UN 2002: 'Plan of Implementation of the World Summit on Sustainable Development'). This emphasis may give new impetus to work on consumption and production patterns, as practical achievements in this area in the nineties have been on a limited scale.

Targets

No targets exist

Related policy documents

COM (2001) 264 final
A sustainable Europe for a better world: A European Union strategy for sustainable development. Communication from the Commission to the Council and the European Parliament. COM (2001) 264 final.

COM (2001) 31 final. Environment 2010.
Environment 2010: Our future, our choice, 6th Environmental Action Programme, Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions. COM (2001) 31 final.

Sixth Environment Action Programme

DECISION No 1600/2002/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 22 July 2002 laying down the Sixth Community Environment Action Programme

The EU's Strategy for Sustainable Development Commission of the European Communities CEC (2001b): A Sustainable Europe for a Better World: A European Union Strategy for Sustainable Development (Commission's proposal to the Gothenburg European Council), COM (2001)264 final, Brussels, 15.5.2001

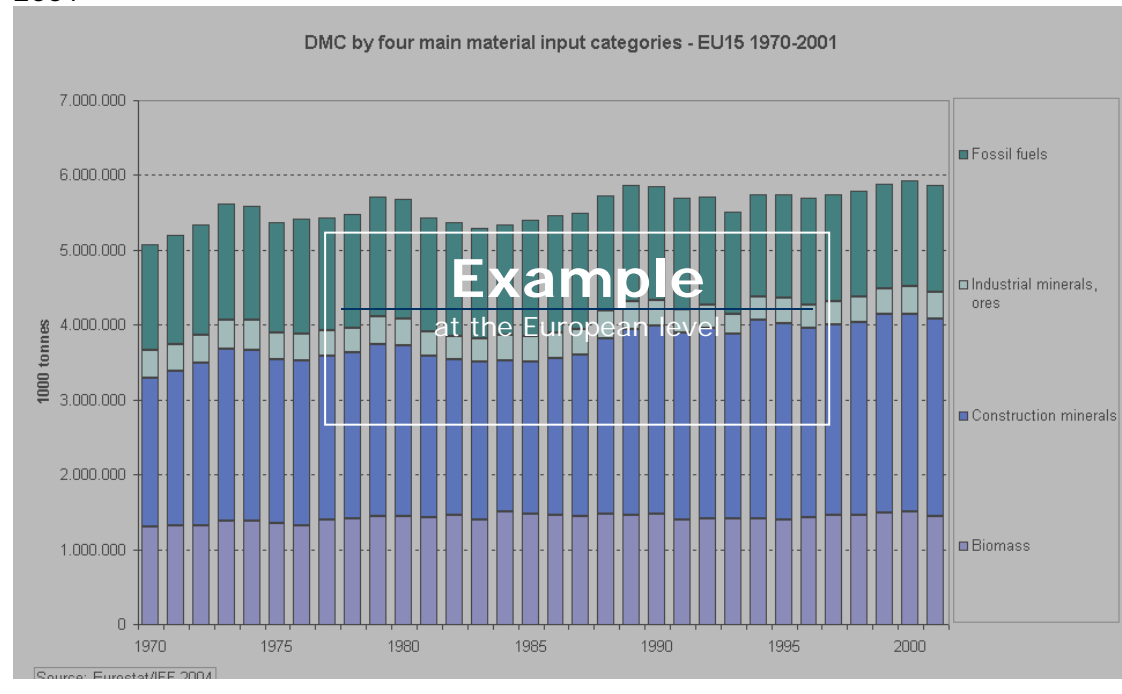World Summit on Sustainable Development Plan of Implementation
UN 2002: 'Plan of Implementation of the World Summit on Sustainable Development'

⊞ Key policy question
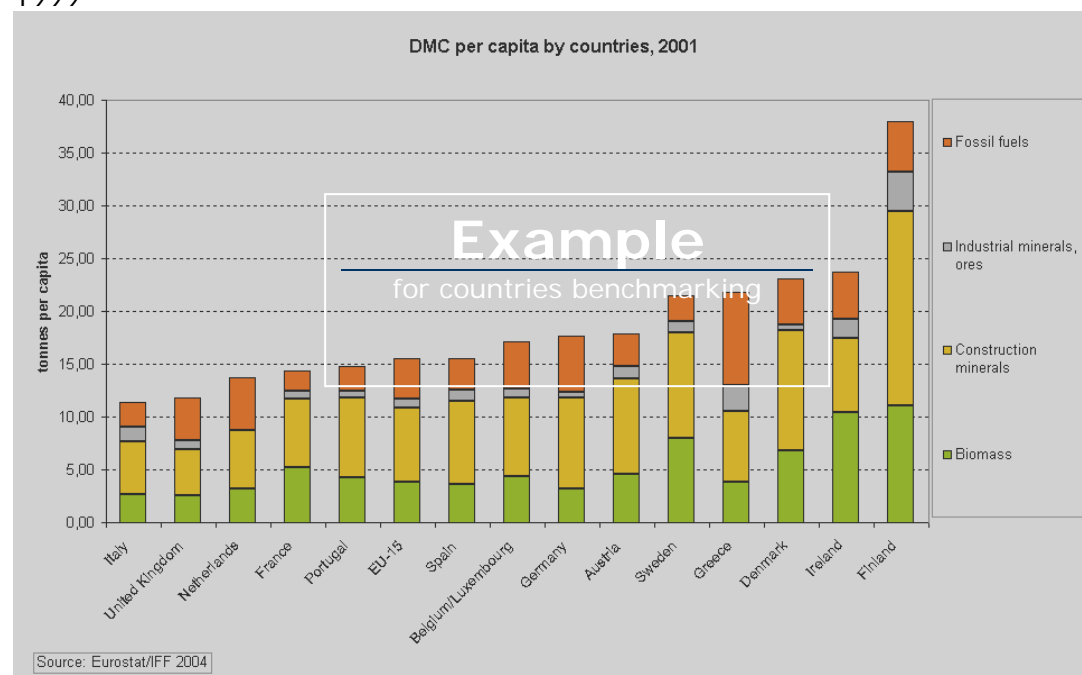
Are we reducing our consumption of resources ?

Graphic example for European level
Title: Domestic Material Consumption (DMC) by main components - EU15 1970-
2001

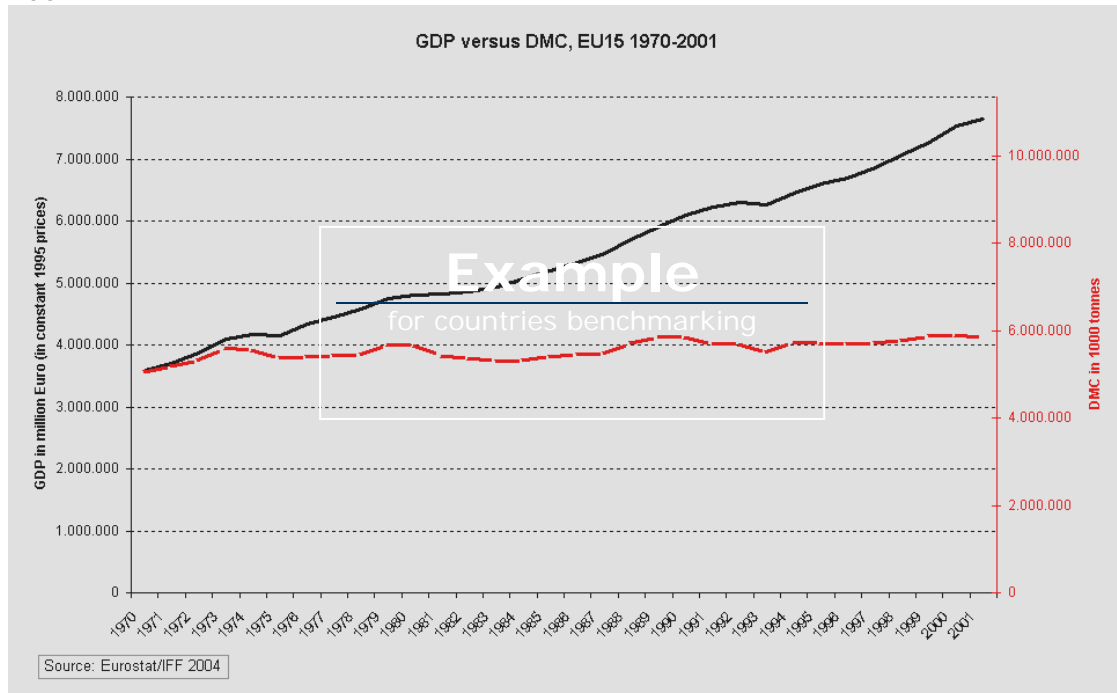

Graphic example for country level
Title: Domestic Material Consumption (DMC) per capita, by country and main components,
1999

Specific policy question

Are we decoupling resource use from economic growth ?

Graphic example for European level
Title: GDP versus DMC EU15, 1970-
2001

GDP versus DMC, EU15 1970-2001

Source: Eurostat/IFF 2004

Graphic example for country level

No graphic examples available here.

The DMC indicator is derived from economy-wide material flow accounts. The methodology for economy-wide material flow accounts is laid down in a methodological guide developed by a Eurostat led task force of experts (Eurostat 2001: Economy-wide material flow accounts and derived indicators - A methodological guide. Luxembourg.

There is no regular data collection by Eurostat (e.g. through the Joint Questionnaire). However, Eurostat is encouraging Member States' statistical or environmental authorities to compile economy-wide material flow accounts at national level. The mid to long term objective of Eurostat is to collect economy-wide material flow accounts and derived indicators from the Member States.

In the interim, Eurostat has been commissioning studies in order to derive estimates of economy-wide material flows accounts and indicators (including DMC) for the EU-15:

Eurostat 2002: Material Use in the European Union 1980-2000: indicators and analysis, working paper and Studies series, Eurostat, Luxembourg

Eurostat/IF 2004: Economy-wide Material Flow Accounts and Indicators of Resource Use for the EU-15: 1970-2001, Series B, Luxembourg

The advantage of DMI and DMC compared to other environmental statistics often based on estimates, is that they are compiled regularly by Eurostat using a standardised methodology, and that the required data are relatively easily available and of sufficient quality.

The individual components of DMI and DMC (i.e. domestic extraction used, imports, and exports) are calculated based on available statistical sources. In some cases, estimations have to be performed in order to translate the available statistics into material inputs as defined by the Eurostat MFA Guide. Agricultural, forestry and fishery statistics form the basis for domestic extraction of biomass. Domestic extraction of minerals is generally based on production statistics. Alternatively, international statistics can be used (the most common are from US Geological Survey and British Geological Survey). Domestic extractions of metals have to be counted in ore-equivalents. However, in some cases the mineral statistics report in metal content. In those cases, the amount of ore has to be estimated from the metal content applying metal concentration coefficients. Domestic extraction, imports and exports of fossil fuels can be derived from national or

international energy balances (e.g. Eurostat or IEA), which report most fossil energy carriers also in tonnes. All remaining imports and exports can be derived from foreign trade statistics, which usually report also in tonnes.

All in all, the statistical robustness of direct material accounts is fairly high since they are mainly based on available quality statistics. With the exception of some minor cases (biomass from grazing, calculating from metal content into metal ore) no estimations are required. If DMC is calculated, the DMI indicator will be available as well (because it is the basis for calculation).

The computation of TMR and TMC (not proposed for this indicator but part of the MFA indicator family) requires additional data related to unused domestic extraction and indirect flows associated to imports and exports. In contrast to DMI and DMC accounts, this additional information can not immediately be derived from official statistical sources. For unused domestic extraction, statistics on mining overburden, ancillary mass etc. can sometimes be obtained from publications by the respective mining industries or their associations. Often specific estimation procedures using coefficients e.g. from scientific literature may have to be developed. The latter particularly applies to estimating the indirect flows associated with imports. Estimation procedures and coefficients are available in scientific studies, mainly for raw materials and semi-manufactured products. So far, hardly any coefficients exist for any finished product (Eurostat 2001). For some imported raw materials specific information from statistical sources of the country of origin may be used too.

Methodology for gap filling
National data and information has also been used in the calculation and adjustment of data

Methodology references:

Economy-wide Material Flow Accounts and Indicators of Resource Use for the EU-15: 1970-2001 (No link specified)
Eurostat/IF, Series B, 2004, Luxembourg (in preparation)

Economy-wide material flow accounts and derived indicators - A methodological guide
Eurostat, 2001, Luxembourg

Material Use in the European Union 1980-2000
Eurostat, 2002, indicators and analysis, Working paper and studies series, Luxembourg

Data specifications

Data set title ▲	Source	Reporting obligations (ROD)
FAO-STAT Statistical Database	Food and Agriculture Organisation (External source)	No ROD info available because this dataset is not stored in EEA Data service.
Oil, Gas, Coal & Electricity. Quarterly Statistics	IEA/OECD (External source)	No ROD info available because this dataset is not stored in EEA Data service.
Basic energy statistics	IEA/OECD (External source)	No ROD info available because this dataset is not stored in EEA Data service.
Population by sex and age on 1. January of each year	Eurostat (External source)	No ROD info available because this dataset is not stored in EEA Data service.
COMEXT database on foreign trade	Eurostat (External source)	No ROD info available because this dataset is not stored in EEA Data service.
World Mineral Statistics	British Geological Survey (External source)	No ROD info available because this dataset is not stored in EEA Data service.
Minerals Yearbook	U.S. Geological Survey (External source)	No ROD info available because this dataset is not stored in EEA Data service.
Industrial Commodity Production Statistics Database	United Nations (External source)	No ROD info available because this dataset is not stored in EEA Data service.
National Accounts of OECD Countries (Main aggregates)	OECD (External source)	No ROD info available because this dataset is not stored in EEA Data service.
Statistical Compendium (OSC)	OECD (External source)	No ROD info available because this dataset is not stored in EEA Data service.
Timber Database	UNECE (External source)	No ROD info available because this dataset is not stored in EEA Data service.
Temporate and boreal forest resources assessment (TBFRA)	UNECE (External source)	No ROD info available because this dataset is not stored in EEA Data service.
Gross domestic product at 1995 market prices	Eurostat (External source)	No ROD info available because this dataset is not stored in EEA Data service.
Aquaculture production (quantities)	Food and Agriculture Organisation (External source)	No ROD info available because this dataset is not stored in EEA Data service.
National Material Flow Accounts	Eurostat (External source)	No ROD info available because this dataset is not stored in EEA Data service.

⊕ Uncertainties

Methodology uncertainty

The methodology is clearly defined by the aforementioned Eurostat methodological guide.

DMC is only one of a number of aggregate material flow indicators deriveable from these accounts which can be used to indicate aggregated resource use of national economies. Other indicators (e.g. DMI, TMR or TMC) can also be used to indicate aggregated resource use of national economies. The single indicators vary in their defintion and underlying accounting algorythms and hence in the subject they express.

Data sets uncertainty

EU15: Due to different statistical sources the components of DMC vary with regard to their reliability and robustness. E.g. imports are very reliable and robust since they are derived from Eurostat's foreign trade statistics (COMEXT). Domestic extraction of fossil fuels is also very reliable and robust since it is derived from the International Energy Agency's energy balances. Domestic extraction of biomass is based on FAO statistics and also reliable and robust. The reliability and robustness for domestic extractions of minerals is probably lower since several international sources are used which have different reporting categories and periods (e.g. US Geological Survey; European Minerals Yearbook; British Geological Survey: UN Industrial Yearbook).

Rationale uncertainty

No uncertainty has been specified

⚒ Further work

No further work has been specified

General metadata

Identification	Classification
CSI code	DPSIR
038	P
IMS internal code	Typology
ISpecification20050304160954	A
Version	EEA themes
2005/03/09 15:02:00 GMT+1	

- industry
- management
- natural
- other_issues
- population
- waste

Responsability and ownership	Status in CSI
EEA Responsible Manager	Status
KAZMIERCZYK, Pawel	Proposed for core set
Ownership	Comment

- EEA
- Eurostat

Proposed on the 4 March 2005 by: European Topic Centre on Resource and Waste Management.

Visibility
Published on EEA website
No