

Materials

5.1 Material flows

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5.1 Material flows

The consumption of goods affects the environment in many ways. First of all, natural resources are needed as input for the production process. Their extraction may cause their depletion. Secondly, environmentally harmful substances may be released into the environment during the production process. Eventually goods are discarded and become waste that requires further treatment. Waste will largely be recycled but some part will end up in the environment, either after incineration or in landfills. Besides these environmental issues, materials, and especially natural resources play a key role in the industrial production processes. In recent years some resources were greatly in demand, which has led to scarcity and high prices. This development puts pressure on the security of supply of some materials.

Material flow accounts describe the inputs, throughputs and outputs of goods in the economy in material terms. They include all goods that enter or leave the economy¹ ranging from raw materials, semi-finished products and final products. All goods are assigned to one of five basic categories - biomass, metals, non-metallic minerals, fossil fuels and other products - based on their predominant make-up. Cars for instance are assigned to metals. Material flow accounts support policies that deal with material use, dematerialization and material substitution. For a description of the methodology and definitions used see Delahaye and Nootenboom (2008). The data on materials flows can be found on [StatLine](#), the electronic database of Statistics Netherlands.

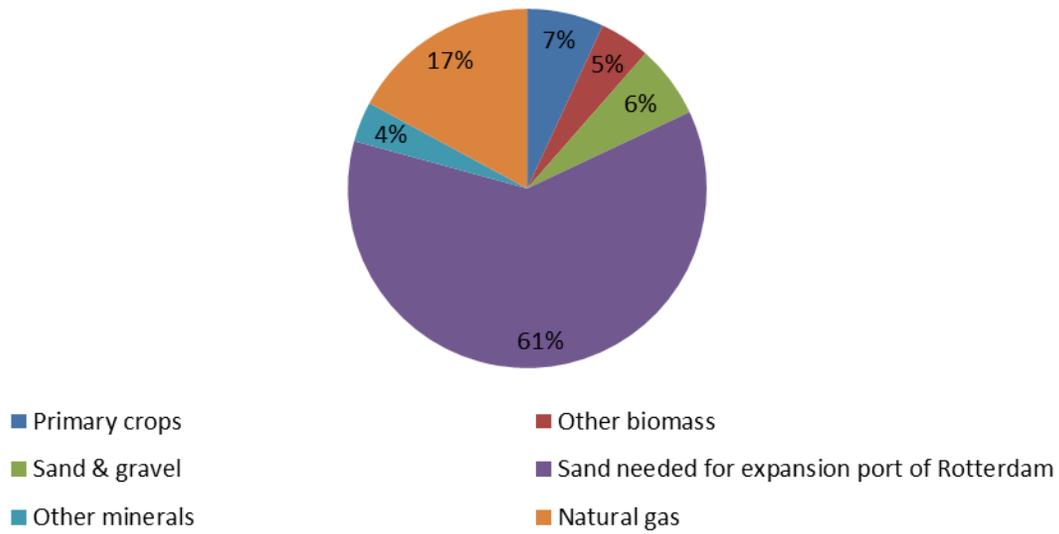
Extraction mainly consists of sand and gravel

Domestic extraction of natural resources in the Netherlands (366 billion kilograms in 2011) largely consists of gravel and sand. Around 90 percent of the sand and gravel is used in infrastructural projects to raise roads and land for the construction of buildings or to strengthen dikes and coastal defences. In the period 2009-2011 a large amount (61 percent) was needed for the expansion of the port of Rotterdam, the so-called 'Tweede Maasvlakte'. The remainder is used in the production of concrete and cement. The extraction of natural gas accounts for 17 percent of total extraction, as the substantial natural gas reserves of the Netherlands are exploited.²

¹ excluding bulk water

² The extraction of oil is too little to take into account.

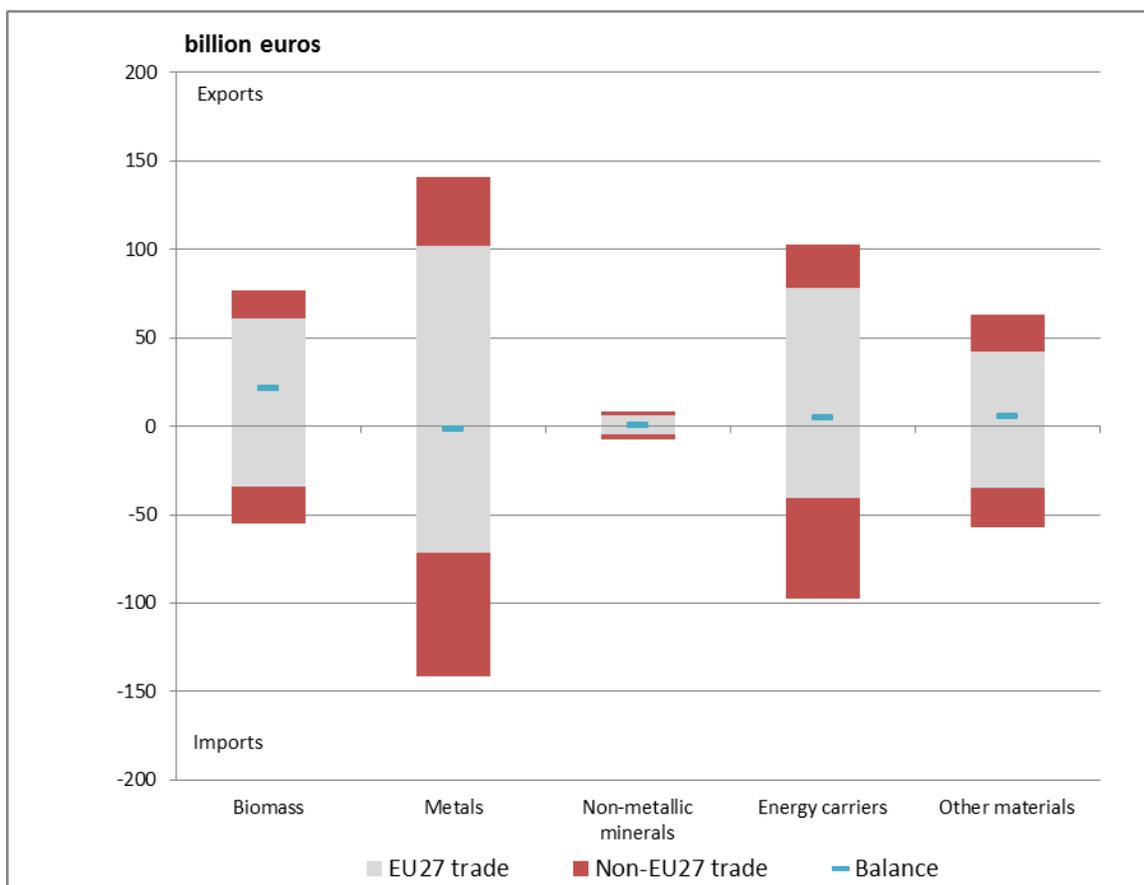
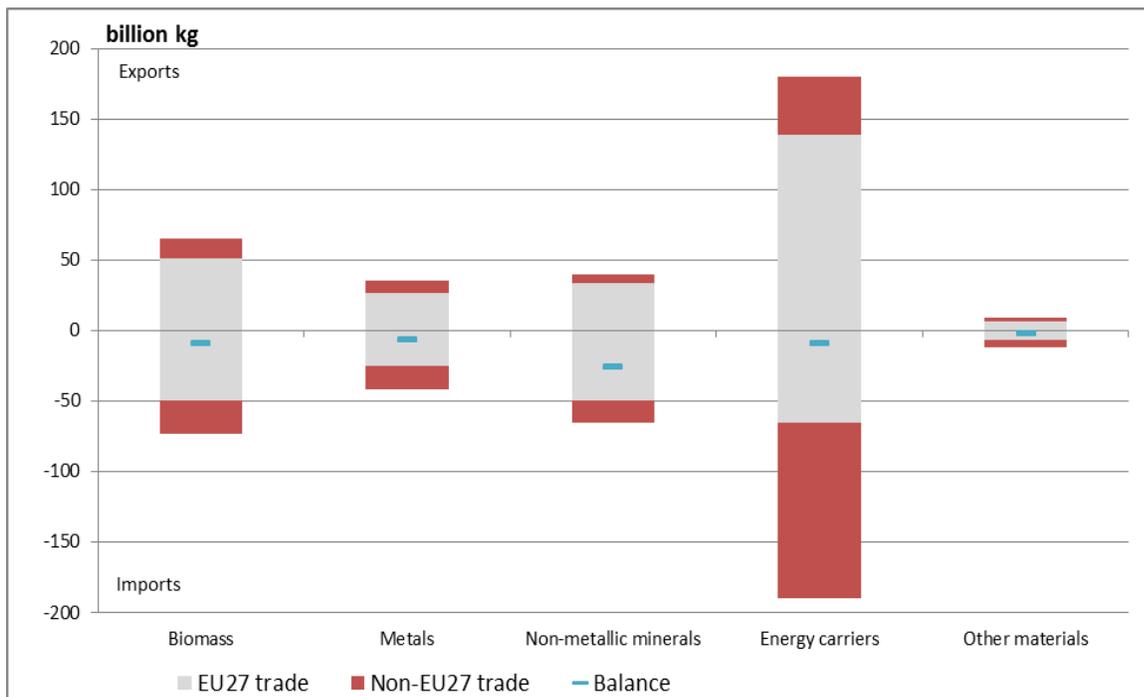
Figure 5.1.1: Domestic extraction (total of 366 billion kg) for the Netherlands, 2011.



Physical trade deficit, monetary trade surplus

The extraction of natural resources is not sufficient to meet domestic demand. Therefore, the Netherlands depend on imports of resources and goods from other countries. The Dutch imports of materials reached 382 billion kilograms in 2011. At the same time other countries depend on the Netherlands for their material needs. The Dutch exports of goods amounted to around 331 billion kilograms in 2011. Figure 5.1.2 shows the physical (upper graph) and monetary (lower graph) imports (-) and exports (+) for five groups of materials. A distinction is made between flows to and from EU27 and to and from non-European countries (non-EU27).

5.1.2. Physical (upper graph) and monetary (lower graph) imports (-) and exports (+) for groups of materials by the Netherlands, 2011.



Overall, the Netherlands have a physical trade deficit, which implies that imports of materials exceed exports in terms of weight. At the same time there is a monetary trade surplus indicating that the export value is higher than the import value. The Dutch economy can therefore be characterized as one that turns cheap bulk materials into more expensive high-quality products. The monetary trade surplus is particularly high for biomass, given the exports of, for example, vegetables, flowers and cigarettes. The Netherlands also has a monetary trade surplus for energy carriers. Imports consist mainly of crude oil while exports consist of more expensive oil products, such as petrol, and domestically extracted natural gas. In monetary terms the volume of imports and exports is relatively large for metals and metal products, such as cars and electronics.

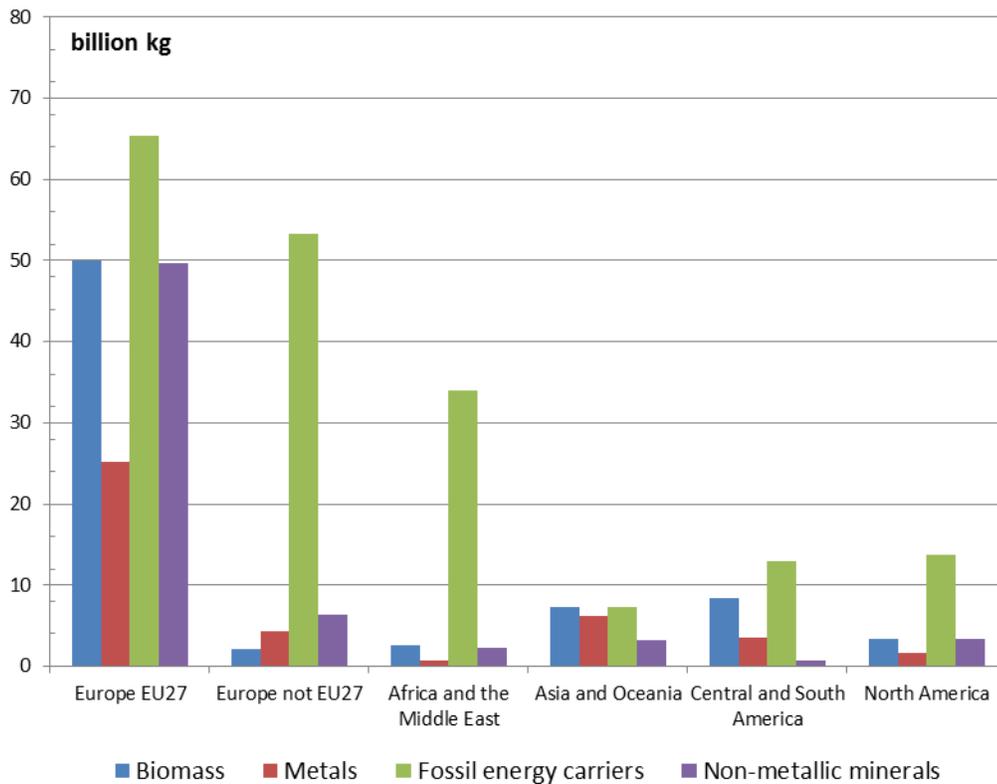
At the import side, the trade with EU27 and non-EU27 countries in physical terms is nearly fifty-fifty. The Netherlands is very dependent on non-EU countries for energy carriers, almost 66 percent. For all other groups of materials the dependency on EU countries is about two thirds. Energy carriers are the largest material group, so the development in this category is most important for the total division of imports between EU27 and non-EU27. On the other hand, the Netherlands exports a great many energy carriers to countries in the EU. As a consequence, the share of EU27 and non-EU27 trade in physical terms on the export side is 78 percent and 22 percent respectively. The EU is very important for the export-orientated Dutch market. In monetary terms, the divisions in terms of percentages between EU27 and non-EU27 are more or less the same.

The largest physical trade deficit is in minerals, which can be attributed to the massive imports of sand and gravel. The extraction of sand and gravel in the Netherlands itself is limited. Besides re-exports, imported sand and gravel are mainly used in the construction industry and for the production of concrete and cement. Sand used in infrastructural works, for example in the foundations of roads and houses, is not imported.

Dematerialization of the Dutch economy

In figure 5.1.2 the imports and exports figures for European countries are published and discussed. A distinction is made between EU27 and non-EU27. Figure 5.1.3 shows the import figures for different parts of the world and not only for European countries.

5.1.3 Imports from the rest of the world



The physical import and export volumes are dominated by energy carriers. Energy carriers and their derived products are largely imported from other European countries: Norway natural gas and Russia for crude oil. Almost all coal comes from non-European regions: South America and Africa. Exports of energy carriers are destined for the European market and consist mainly of petroleum products and natural gas. Biomass flows are also relatively large in physical terms. A closer look at the biomass flows reveals that they consist mainly of primary crops (processed and non-processed crops that are not directly used as animal feed). Cereals make up 40 percent of the primary crops imported. They are mainly imported from France. The imports of oil bearing crops, especially soybeans, are also relatively large. Soybeans mostly come from Brazil and are mainly processed into animal feed. The physical exports of primary biomass consists mainly of vegetables and products made from potatoes.

Dematerialization of the Dutch economy

Domestic material consumption (DMC) is an indicator that expresses the total consumption of materials by the economy. It is estimated by adding the amount of extraction to the imports and subtracting the exports. In 2011 the DMC was much higher than in 1996, but not as high as in 2009 and 2010. In the period 1996-2011 the economy grew by 36 percent. Until 2008, there

was a clear dematerialization of the Dutch economy. The expansion of the port of Rotterdam greatly raised the domestic demand for sand from 2008 onwards. If we do not take this part of the total extraction of sand and gravel into account, the Dutch economy continued to dematerialize, so there is dematerialization from 1996 onwards.

The difference between exports and imports is a relative small part of the total DMC. Therefore, changes in DMC over time are mainly determined by the extraction of materials. In turn, extraction is dominated by minerals and especially sand and gravel. There is a peak around the year 2000, when there was a great demand for sand used for the construction of two high-speed railway links. As mentioned above the enormous increase of extraction of sand and gravel in 2009 and 2010 was caused by the amount of sand needed for the expansion of the port of Rotterdam. For this reason this kind of sand is not taken into account in figure 4.1.4.

Figure 5.1.4 Domestic material consumption for different material categories in time (excluding sand needed for the expansion of the port of Rotterdam)

