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Waste accounts in a NAMEA framework

Roel Delahaye

Statistics Netherlands

MOO
MSP

P.O.Box 4000
2270 JM Voorburg
The Netherlands

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***Summary**: In this study physical supply and use tables for solid waste residuals are compiled for 2003. The motive for developing new Dutch waste accounts was the need to improve the current waste accounts and the availability of data conform the recently effective European Waste Statistics Regulation. The waste registration data was converted in order to meet the NAMEA accounting concepts described in the SEEA 2003 handbook. Major SEEA concepts taken into account were the resident principle, the economic-environment boundary and the distinction between products and residuals. The latter concept implies a distinction between solid waste with (products) and without (residuals) a monetary value. The current SEEA does not offer practical guidelines to achieve this distinction. This survey presents practical solutions to problems that occur in the process of converting waste registration data into accounting data.*

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Contents

1. Introduction

1.1 Objective and structure

One component of the Dutch environmental accounts that needs further development are the solid waste accounts. The aim of this paper is to set up waste accounts for 2003 according to NAMEA concepts. These correspond to a large with the ones described in the handbook on Integrated Environmental and Economic Accounting (SEEA, Commission of the European Communities et al., 2003).

Chapter 1 gives a short introduction into the Dutch environmental accounts. Accounting principles relevant to the waste accounts will be discussed. In chapter 2 the state of the current Dutch waste accounts is discussed in more detail. Shortcomings of the current NAMEA are presented. Chapter 3 discusses developments on waste accounts frameworks suggested by Eurostat. Chapter 4 provides an overview of the data requirements of the extended waste accounts. Chapter 5 gives an overview of the usefulness of the available data sources for the waste accounts. In chapter 6 the available data is practically implemented. This results in physical supply and use tables of waste for the year 2003. In chapter 7, possible future developments are discussed. In chapter 8, definitions are given of the waste related terms discussed in this paper.

1.2 NAMEA

In the early nineties, the Dutch national accounts were extended by two environmental accounts: a substances account and an account for environmental themes (Keuning, 1993). These accounts present information on environmental pressure and are expressed in physical units. The integrated system of environmental and economic accounts was referred to as the NAMEA (National Accounting Matrix including Environmental Accounts) (de Haan and Keuning, 1996). The NAMEA-system yields consistent estimates for all conventional economic aggregates as well as for environmental indicators (CBS, 2005a). Importantly, this system enables a comparison between the contribution of all economic activities to conventional policy goals (GDP, exports, employment, etc.) and their contribution to major environmental problems (greenhouse effect, ozone layer depletion, acidification, etc.).

One substance account in the NAMEA considers solid waste. The solid waste account in the NAMEA mainly focuses on waste treatment and storage problems in the Netherlands. For an extended overview of integrated environmental and economic accounting see the thesis by de Haan (2004) and the SEEA handbook (Commission of the European Communities et al., 2003). The concepts in the SEEA are applied to set up the waste accounts.

1.3 Waste accounting principles

1.3.1 Economic – environment boundary

The solid waste account of the NAMEA follows an accounting scheme that maintains a strict division between the economy and the environment. The NAMEA primarily focuses on the material transfers that take place from the economic system to the natural environment. Waste flows associated with monetary commodity transactions do not enter the NAMEA substances account. From an environmental perspective, the NAMEA systematically exposes the national accounts system's boundaries and the physical substance flow accounts logically expand these boundaries. In the SEEA (Commission of the European Communities et al., 2003) the economy/environment interface is discussed more extensively.

In the environmental accounts both the pollution generated by economic activities and the accumulation of hazardous substances in the Dutch environment are incorporated. The accumulation is equal to the domestic generation of pollutants, minus their absorption by environmental treatment services (e.g. waste incineration) and minus the balance of trans-boundary pollutant flows to and from other countries. Internally recycled waste is by convention not included in the NAMEA.

A conceptually correct recording of solid waste would be to include waste stored on human controlled landfills (similarly as incinerated waste) as a re-absorption of waste by the sewage and refuse disposal services industries. The consequence of this recording would be that emissions from landfills should be attributed to the corresponding waste management industry since this recording defines landfills as a stock of residuals controlled within the economic sphere. Only the uncontrolled dumping of waste would be reflected in the NAMEA indicator. Currently, the Dutch NAMEA does not distinguish between direct waste discharges to the environmental and storage of waste in controlled landfills. The current waste indicator in the NAMEA reflects the annual amount of waste that has to be stored regardless its precise destination. Our adopted treatment of landfills is recorded in the SEEA as the simplified approach.

Although, according to the above reasoning, leakages from landfill sites must be regarded as flows within the environment, the Dutch NAMEA records these leakages (e.g. methane, CH_4), as economic-environmental material transfers. This minor inconsistency is introduced on practical grounds (see de Haan, 2004). Firstly, the reduction of solid waste storage in landfills has been a specifically addressed policy goal in the Netherlands, and it seems for that reason relevant to explicitly address the accumulation of waste on landfills in the environmental performance indicators of the NAMEA. Secondly, it should be acknowledged that emissions from landfills are part of the human induced environmental burdens which can be considerable.

1.3.2 Waste products versus residuals

The demarcation between the economy and the environment is accompanied by a sub-categorization of waste with and without an economic value. Waste with an economic value to the generator is considered a waste product and has a monetary equivalent in the national accounts. Waste with no market value to the generator is considered a residual and appears in the substance account. Like products, residuals may be transferred within the economy as a result of recycling or waste collection and treatment activities. Monetary transactions as a result of waste treatment services are recorded in the national accounts. Waste treatment usually results in the replacement or transformation of residuals with the purpose of diminishing their environmental impacts. Those residuals that are not re-absorbed by the economy will be transferred from the economy into the natural environment.

Flows of residuals from the environment to the economy can also occur. For example, tankers at sea may lose their cargo in a storm. Efforts might then be made to recover these residuals from the environment and bring them back into the economy for treatment. For a more profound discussion on the compilation of harmonious monetary and physical supply and use tables see the SEEA (Commission of the European Communities *et al.,* 2003). The SEEA, more or less, states waste inputs with a positive price should be regarded as products and recorded as such. This implies a distinction between waste products and residuals. However, the SEEA gives no practical suggestion how to make this distinction.

1.3.3 The resident principle

Data on solid waste are derived from so-called waste inventories. The application of pollution sources in order to establish waste emissions usually differs in these inventories from those in the national accounts. Emission inventories often include emission sources within the boundary of a country while a national accounts-based demarcation of emission sources can only be established on the basis of the resident principle i.e. all agents that take part in an economy of a country whether operating within the national territory or abroad. The resident principle guarantees that macroeconomic indicators such as Domestic Product and National Income are comparable between countries and can be added straightforwardly over countries. The resident principle is therefore important in the recording of waste generated by an economy. This importance is also discussed in the SEEA.

Connecting physical waste flow data from inventories to national accounts data will result in modification of the original emission data. In order for the environmental consequences of these activities to be taken into account in the NAMEA, it is necessary to add waste emissions by residents in the rest of the world and deduct emissions by non-residents in the Netherlands.

Consistency between physical flow accounts and the national accounts guarantees not only a consistent comparison of environmental burdens to economic benefits (or environmental benefits to economic costs) but also a consistent demarcation of the environmental burdens of the economic systems of individual countries.

2. Solid waste accounts in the Dutch NAMEA: Current state

2.1 Solid waste accounts

Throughout this report terms are used that can be subject to ambiguous interpretations. For clarity sake, the terms as they are used in this paper are defined in chapter 8. Definitions are derived from several sources but mainly from EIONET (www.waste.eionet.eu.int/definitions/waste).

The waste accounts in the current NAMEA are restricted to those waste flows directly resulting from either production or consumption activities. Dissipative use of products and dissipative losses are beyond the scope of the current waste accounts. These outputs refer to uses of products on agricultural land (e.g. pesticides), on roads (salt) and for other purposes, and to dissipative losses by erosion and corrosion of infrastructures, by abrasion of car tires, brake discs and engine leakages. Also not included in the current NAMEA waste accounts are movement of matter i.e. excavations and material movements in mining and construction operations. Including these material movements would expand the notion of waste enormously.

2.2 Shortcoming of the current NAMEA waste accounts

A overview of shortcomings of the current NAMEA waste accounts can are presented.. In chapter 4 the data needed to overcome these shortcomings is presented.

- Although the current NAMEA waste accounts distinguish around 40 industrial categories, it does not meet the classification required for the NAMEA 2004 publication.
- Although in the current waste accounts some distinction between waste types can be made, elaborate reporting of different waste types has not taken place.
- Currently, the waste accounts do not incorporate im- and export of waste. To be able to construct complete waste accounts, cross-boundary flows are essential.
- In the current waste accounts only incinerated and landfill waste are considered. For complete waste accounts recycled residuals should are also be considered.
- In the current waste accounts a direct link between the physical and monetary data is not made explicitly.

- The amount of waste incinerated by incineration plants is taken as the total amount of absorption in the current NAMEA. For a complete picture, absorption should be determined by the total amount of residuals returning to the economy.

3. Further development

3.1 Eurostat

A joint Eurostat/EFTA group meeting resulted in a paper on the development of waste accounts for the NAMEA (Pasquier, 2003). Eurostat's proposal for the development of waste accounts for NAMEA is based on the Waste Statistics Regulation (WStatR; European Communities, 2002). The waste categories (according to eural codes), waste treatment methods and the NACE-based economic classification defined within the WStatR, serve as baseline for developing the NAMEA waste accounts.

4. Overview of desired features

This chapter will give an overview of the features that should appear in the new waste accounts in order to overcome the shortcomings of the waste accounts pointed out in chapter 2 and satisfy the interest of further development as discussed in chapter 3. The desired information will be presented as supply and use tables.

1. An extension of the number of waste categories. The classification of waste categories should be according to the WStatR. In annex 1 the distinguished waste categories are presented.
2. NACE classification in accordance with the standard NAMEA classification. In annex 2 the distinguished industrial categories are presented.
3. A distinction between waste products and residuals.
4. Waste import and export.
5. Internally and externally treated waste.
6. Besides land filled waste and incinerated waste (with and without energy recovery), recycled waste should be incorporated.
7. An explicit link between physical and monetary data. For example, disposal fees, expenditure, taxes and subsidies should be presented in relation to physical waste flows.
8. Include all residuals absorbed by the economy

4.1 Supply and use tables

It is very important to set up the waste accounts in a way they can easily be incorporated in the framework of the NAMEA. Therefore data on waste is presented in the format of supply and use tables. See CBS (2005a) or the SEEA handbook for a more detailed explanation of the system of supply and use tables.

The supply and use tables show an integral picture of the flows of commodities through the economy whereby in principle every product, every producer and every consumer is taken into account. That makes this system a convenient starting point for the compilation of physical accounts. The supply and use tables fulfill a main identity, which plays an important role in compiling the tables. The identity holds for each commodity group (i.e. for each row of the supply and use tables):

1) total supply = total use

or in more detail, for each commodity group of interest holds:

2) output of industries + imports =

inputs of industries + exports +consumption by households and government + fixed capital formation + changes in stocks.

The monetary supply and use tables emphasize the commodities relevant from the point of view of waste products. The physical supply and use tables can be compiled in a similar way. Waste products in the physical tables have a match in the monetary tables. Physical supply and use tables of residuals are an extension from the tables containing the waste products. The physical entities of residuals are included in the substances account. Often residuals have a negative economic value: producers have to pay a price to get rid of their waste. This monetary transaction is recorded as a waste treatment service in the national accounts system.

5. Data Availability

Physical and monetary data are available from different sources. One mayor source is Statistics Netherlands, another one SenterNovem (AOO, 2004a). SenterNovem is an agency of the Dutch Ministry of Economic Affairs for implementing policies on innovation, energy, climate and environment and spatial planning. The following chapters give an overview of the availability and usefulness of data from respectively Statistics Netherlands, SenterNovem and the WAR (Werkgroep Afvalregistratie – i.e. working party on waste registration, AOO (2004b)). SenterNovem manages a database that contains physical data on waste flows from different sources. The database contains data from 2002 onwards.

This chapter sums up with an overview of all available sources from which conclusions are drawn considering the usefulness of the data in order to fulfill the needs discussed in chapter 4. From these conclusions a recommendation is given on the practical implementation of the data into the waste accounts. The results of this implementation are given in chapter 6.

5.1 SenterNovem database

All data sources contain waste types labeled according to Dutch LAP codes and not to the European eural codes. SenterNovem converted the LAP codes to eural codes (eural codes represent waste categories as defined within the WstatR). This resulted in a database in which about 75 eural coded waste types can be distinguished. From 2005 onwards conversion is no longer necessary as waste registration will take place according to eural codes. On the supply side about 30 NACE categories are distinguished (notice that a small amount of waste could not be allocated to a NACE category). Waste is allocated to a waste category on the basis of its status at the time of generation. Thus, the amount of ferro waste refers to ferro waste that originated as such during a production or consumption process. This means that the amount of ferro in, for example, discarded vehicles or household waste is not included in the “ferro waste” category. However, other data sources, like the one on import/export, probably register ferro from different eural categories as “ferro waste”. The inconsistency in time of recording between different data sources of the same waste categories might provide problems when integrating the data sources. Another inconsistency between data sources lies in the allocation of different substances to a single waste category. For example, the non-ferro waste category in the NA also refers to slag and ashes that contain non-ferro waste. According to eural codes definitions, the non-ferro waste category does not contain slag and ashes.

On the use side, only data on waste treatment methods are available for different waste types. Thus, no information on NACE is available on the use side. SenterNovem makes an effort to report final treatment method of specific waste types (recycling, landfill, incineration). Take for example discarded vehicles. Almost 100% go to a recycler but they are booked as 85% recycled and 15% landfill. However, the treatment of industrial wastes (CBS, 2005b) seems to be determined on the basis of their first destination after disposal. Thus, waste destined for a recycler is booked as 100% recycled even if a certain percentage ends up at a landfill. Notice that SenterNovem could not allocate all waste to a specific NACE, nor did they know the treatment method for all waste types.

The amount of generated waste does not equal the amount of treated waste. Reasons for this discrepancy lie in the difficulty of eliminating double counted waste, storage of waste and merging or separation of waste flows (and thus a change in eural code). An effort is made to remove double counted waste. Waste produced by NACE 37 consists mostly of remains from recycled waste. This waste has already been reported when first produced and is not included in the database. Therefore only a small amount of waste produced by NACE 37 is presented in the database.

The SenterNovem database contains data from registered waste at the time of generation. It does not contain specific data on the import/export of waste. However, the amounts of produced and treated waste reported at both the supply and use side include exported waste (but not imported waste). According to the concept of the national accounts, the amounts of treated waste on the use side should contain imported waste but not exported waste. Therefore, adjustments at the use side have to be made before the SenterNovem data can be implemented in the NAMEA. The SenterNovem data on the supply side do not need adjustment. As discussed before, in order for the SenterNovem data to fit the NAMEA concept a distinction has to be made between waste products and residuals.

5.2 Conclusions

Table 5.5 gives an overview of some of the properties of the individual data sources. These properties determine the usefulness of the data sources in order to set up the waste accounts. From this table the following conclusions can be drawn:

1. Useful monetary data related to waste products is scarce. In monetary terms waste products are often not given much consideration because of their low values.

2. Most monetary data are concerned with expenses made on waste treatment or waste abatement. It is doubtful if the nature of the expenses or the waste types involved can be determined for many NACE categories.

3. It is difficult to link physical with monetary data because physical data concern both waste products and residuals as monetary data are either concerned with waste products or expenditure on treatment or abatement of residues.

4. Useful physical waste data are available on the supply side and for final treatment (SenterNovem database). On the use side not much data are available.

5. Useful physical import and export data are available.

Data source	Indus. Clas.	monetary	physical	imp/exp	supply	use	treatment	haz & n-haz	waste types	time series	**Use-fullness**	remarks
National Accounts	all	+	-	+	+	+	-	-	+/-	+	+/-	Only valuable waste is considered.
Prodcom	10 - 41, not 37	+	+	-	+	-	-	-	-	+	-	Very few waste types can be distinguished
Foreign trade statistics	all	+	+/-	+	-	-	-	+/-	+/-	+	+/-	Only waste with a value above threshold is considered
Industrial waste statistics	10-41	-	+	-	+	-	+	n-haz	+	+/-	+	
Private recyclers statistics - physical	37	-	+	-	+	-	+	+	+	+/-	+	
Private recyclers statistics - monetary	37	+	-	-	+/-	+/-	+/-	-	+/-	-	-	Only useful data between 1998-2001 available
Private sewage and refuse services statistics	90	+	+	-	-	+/-	+/-	-	+	-	-	Only useful monetary data between 1997-2001 available
Communal sewage and refuse services statistics	90	+	+	-	-	+	+	-	+	+	+	
Car wrecks statistics	households	-	+	-	+	-	-	-	-	+	+/-	Useful in combination with ARN data
Municipalities statistics	households	+	+	-	+	-	+	+/-	+	+	+	
Environmental expenditure statistics	10- 41	+	-	-	-	+/-	-	+	+/-	+	+/-	Difficult to distinguish waste type and treatment/abatement.
LMA - hazardous waste	all	-	+	-	+	+/-	+/-	haz	+	+/-	+	SBI ' 74 classification. S/N takes over monitoring.
Motivaction	50-99	-	+	-	+	-	-	-	+/-	+/-	+/-	Data not always reliable due to small sample survey.
IMA - import export	all	-	+	+	+	+/-	+/-	+/-	+	+/-	+	No SBI classification. S/N takes over monitoring.
Pilot study - waste from agriculture and forestry, fishery	01, 02, 05	-	+	-	+	+/-	+	+	+	-	+	Compilation method is still under construction.
Survey - waste from construction	45	-	+	-	+	-	+	-	+	+/-	+/-	Results from 2005 survey are essential
WAR -group on waste registration	90	-	+	-	-	+	+	-	+	+/-	+	
ARN- Car recycling Netherlands	households	+	+	-	+/-	+/-	+	-	+	+	+/-	Only car wrecks.

Table 5.5: Data availability and usefulness for 2002/2003

Looking at the available data the first step will be to set up physical waste supply and use tables. The database of SenterNovem can act as a starting point. The biggest challenges will be to determine the NACE categories on the use side, incorporate import-export and separate waste product from residuals. Depending on the effort it takes to compile physical supply and use tables, the physical data could be linked with monetary data (valuable waste products and expenditure for waste treatment/abatement). Finally, taxes, subsidies and fees concerning waste could be added. As it will turn out, due to a lack of time and appropriate data sources this paper will only deal with the compilation of physical supply and use tables.

6. Practical implementation of the data

This chapter discusses the conversion of the physical waste data into balanced supply and use tables for waste products and residuals. In balanced tables the supply (import plus domestic production) equals the use (domestic absorption plus export). Subsequently this chapter discusses waste supply, import/export of waste, waste use, and balancing the supply and use tables. Up to section 6.4 the supply and use tables contain both waste products and residuals. Section 6.5 deals with compiling separate supply and use tables for waste products and residuals. In the subsequent section (6.6), incinerated waste and landfill waste are distinguished in order to make differences in the environmental impact as a result of waste treatment more explicit. The aggregated results of the practical implementation are shown in table 6.6. This chapter sums up with conclusion.

6.1 Waste generation

Data on physical waste generation are provided by SenterNovem. On request they provided data for about 75 waste categories (according to European (eural) codes) and more than 30 NACE categories (including households). For some waste types the amount was zero or no specific information was available (a distinction could not be made).

Not all NACE categories could be distinguished on a level of detail required by NAMEA standards. The following procedure was used to break down the aggregated NACE in required subcategories. First of all an attempt was made to identify, for each waste type, the expected producing industry. This was done with the help of waste experts and a detailed description of the production process for each industry branch. If this procedure was not sufficient, waste dependent on the production process (like waste from production materials or rejected products) was broken down according to shares value added. Waste independent of the production process (like office waste or waste from cleaning) was broken down according to the number of employees. This break down procedure can be altered on the basis of new information.

For most waste types, SenterNovem was not able to allocate a small amount to NACE categories. In order to allocate these amounts the following procedure seemed most logical to adopt. If the amount of waste, not allocated to NACE categories, was relative small (less than 10% of the total amount) it was proportional distributed among NACE categories. If the amount, not allocated to a NACE, was relative large, allocation took place on the basis of an expert guess. If these options were not satisfactory, allocations to NACE were made on the basis of information of a similar waste type. For example, an "unknown" hazardous amount could be allocated on the basis of the same non-hazardous waste type. The amounts of sludge are reported by SenterNovem inclusive their water content. In this survey the amount is converted to dry matter. The same applies for manure.

6.2 Import - export

Data on import and export of waste are mainly obtained from two sources: the Foreign trade statistics (FTS) and the International waste registration centre (IMA). Data on waste types from the red (hazardous waste) and amber waste (semi-hazardous waste) list (Annex III & IV of the Council Regulation (EEC) no. 259/93) are obtained from IMA. Waste types that appear on these lists (mostly dangerous wastes) need to be reported to the IMA. The IMA import-export data are divided in recovered waste and finally disposed of waste. On the basis of background details and expert guesses, eural codes were allocated to the different waste types. Waste types also had to be labeled dangerous or non-dangerous.

Data on waste types with a monetary value were obtained from the FTS compiled by Statistics Netherlands (CBS, 2005c). Eural codes had to be assigned to the different waste types. It was assumed that in the FTS only waste types from the green list (Annex II of the Council Regulation (EEC) no. 259/93) appear. Data from the FTS (green list) and the IMA (amber and red list) can be considered complementary.

Transit trade is included in the FTS but not in the IMA data. Transit data on waste types recorded by IMA are not known. In order to match the FTS and IMA data, the FTS needs to be adjusted for transit waste. Unfortunately, the percentage of transit waste could only by estimated on the basis of aggregated commodity categories. In most cases, waste is only a part of these commodity groups. Applying a transit percentage derived from an aggregated commodity category to a waste category results only in a rough estimate of the amount of transit waste.

As mentioned earlier, due to a transformation process, exported waste of a particular type (eural code) can originate from waste that was, at the time of generation, recorded differently (different eural code). For this reason problems occur when integrating the export data with the use data. Take for example exported ferro waste (6.1). Household waste (10.11), discarded vehicles (8.1) and combustion slag (12.42) all contain ferro waste. Most of these waste types are being transformed before being reused or exported. Transformation, like sorting, results in ferro waste flows. When these ferro waste flows are being exported they will no longer be labeled the eural code they originated from (10.11, 8.1, 12.42 etc.) but they will be labeled ferro waste (6.1). As a result of this waste transformation, the recorded export of ferro waste exceeds the recorded production of ferro waste by far. At the same time, the recorded export of household waste (10.11), discarded vehicles (8.1) and combustion slag (12.42) is too low. The next section (6.3) will discuss the problems of integrating export data with use data in more detail.

Data from the FTS are on a higher level of detail than found in the national accounts. In order to implement the FTS data in the waste database the highly detailed waste groups were allocated to eural codes on the bases of their description. For 2003 the following waste groups were distinguished: chemical deposits and residues (3.11), ferro (6.1), precious metal (6.21), aluminum (6.23), copper (6.24), lead (6.25), other metal (6.26), glass (7.1), paper (7.22). plastic (7.42), wood (7.52, 7.53), textile (7.62, 7.63), batteries and accumulators (8.41), animal waste of food preparation and products (9.11), vegetable waste of food preparation and products (9.12), household waste (10.11) and slag and ashes from thermal treatment and combustion (12.42). In some cases allocating eural codes to FTS types of waste was not possible: a FTS waste description could mention too many different types of waste or a waste description could mention both waste products and other kind of products. Thus, some amounts of waste could not be taken into account. As a result, the total amounts of some of the waste categories are too low. This applies for eural codes: 3.11, 9.11, 9.12 and 10.11. Notice that in general the amounts of waste found in the FTS must be considered with great care. Only waste with a value above a certain threshold needs to be reported when imported or exported. Waste with a value below this threshold does not appear in the data source used by the FTS to estimate imports and exports.

As a result of the detailed breakdown in waste types of the FTS data, a direct link to the monetary NA data is lost. For example, detailed FTS waste types distinguish lead waste (6.25), as the NA only distinguishes non-ferro waste (6.2). Also, non-ferro waste in the NA contains slag and ashes. In the detailed FTS data, according to eural definitions, slag and ashes are allocated to a different waste category (12.42).

6.3 Waste absorption

On the use side, SenterNovem provides information on treatment methods but not on waste use per NACE. The following treatment methods are distinguished: incineration with the purpose of waste disposal (D10), incineration with the purpose of generating energy (R1; excluded are waste incineration plants), landfill, discharging, recycling and other. However, due to a lack of data, consistent distinctions between treatment methods could not always be made. As a result some R1 incinerated waste is booked under D10 incineration.

Determination of waste-use by NACE is done on the basis of several sources. From statistics on sustainable energy by Statistics Netherlands the amount of biomass waste incinerated at electricity plants is obtained. Also, data on waste incineration by a cement manufacturer (NACE 26) can be obtained. Some data on waste use by NACE can be obtained from research reports or waste interest groups. Monetary data from the NA are also used to determine waste use by NACE. In the NA the following monetary data on waste use are available: ferro (6.1), precious metal (6.21), aluminum (6.23), copper (6.24), other non-ferro metal (6.26), glass (7.1), paper (7.22), plastic (7.42) and slag and ashes from thermal treatment and combustion (12.42). It is assumed that the monetary distribution of waste across NACE is similar to the physical distribution across waste categories. Therefore, the physical amounts of the above mentioned waste types can be allocated to NACE categories on the basis of the monetary distribution. Although this method is theoretically not completely sound, in practice it turns out that alternative methods do have problems as well. Waste that could not be allocated to a specific NACE is allocated to the following NACE categories: recycled waste to NACE 37 and waste treated differently to NACE 90. However, the way in which SenterNovem reports use-data may pose some uncertainties on the above method of allocating waste to NACE 37 and NACE 90 (see section 5.4 on the SenterNovem database). Take for example batteries: in the SenterNovem database the treatment of batteries is reported as 86% recycling and 14% disposal. These data do not imply that 86% of the total number of batteries is recycled. They only imply that, after treatment, 86% of the materials are re-used. According to the method discussed above batteries are considered residuals of which 86% is used by the recyclers (NACE 37) and 14% is used by disposal services (NACE 90). Regarding batteries, this may be incorrect. Most batteries are probably first used by the recyclers (NACE 37), only after treatment do residuals end up at disposal services (NACE 90) and waste products at other (unknown) NACE categories.

Data on waste absorption from SenterNovem include exported waste but do not include imported waste. In order for the data to fit the accounting concept, on the absorption side, data corrections have to be made: export has to be subtracted and import has to be added to the absorption data from

SenterNovem. Making these adjustments according to a particular methodology turns out to be difficult. A lot depends on the type of waste and the amounts given.

When calculating the adjusted absorption (absorption plus import minus export) for each waste category with disregard of treatment method some negative values occur. These negative values can be a result of allocating eural codes to the wrong waste category. However, they may also be a result of other uncertainties in the data. There are several types of adjustments to solve the occurrence of negative values. Most adjustments involve transferring waste from one waste category to another (similar) waste category. All adjustments made in order to omit negative values are explicitly recorded. The difficulties that occur while adjusting the aggregated absorption data make adjusting the absorption data for separated treatment categories (landfill, incineration, discharge etc.) very difficult and time consuming. Therefore, it seems more appropriate to estimate amounts of waste for different treatment methods after the total supply and use tables are balanced.

6.4 Balancing

According to the national accounts concept the supply and use tables need to be balanced (i.e. domestic production plus import minus domestic absorption minus export equals zero). In order to balance the tables the following procedure is followed. First of all, the total production, import, absorption, export and balance for all waste types are presented in a table. If the balance shows an outstanding amount, the supply and use tables could still be adjusted. After the largest incongruities were eliminated a software application (Winadjust) was used to make small adjustments in order to balance the tables. The application is based on the Langrangian approach of finding a matrix that minimizes a certain distance between the new matrix and the original one using weights and constraint. In the next step the supply and use for each NACE needs to be adjusted according to the balanced totals. In order to accomplish this, the difference between the balanced total and the unbalanced total for each waste type is determined. Next, these amounts are distributed among NACE categories according to the share each NACE took in the total amount of waste. As a result balanced supply and use tables were calculated for all NACE categories and waste types.

6.5 Distinguishing residuals from waste products

Distinguishing residuals from waste products is necessary to reconcile the data with NAMEA conventions (see section 1.3.2). The current section attempts to divide the physical data in waste products and residuals. Due to a lack of reliable data, the distinction is based on NA supply data. The following procedure is followed. First of all, waste types that appear in the NA have by definition monetary values and can therefore be considered products. All other types of waste are considered residuals. Secondly, it is assumed that waste products supplied in the NA by NACE 51.57 (wholesale trade in waste and scrap) are former residuals (see section 5.1.1). Therefore, waste products supplied by NACE 51.57 appear as residuals in the supply and use tables derived from the registration data. In accordance with the above assumptions, for all waste types that appear in the NA the percentages of waste products are calculated (the waste supplied by all NACE categories except NACE 51.57 divided by total amount of waste supply). In order to calculate the above percentages, the monetary NA data are converted to physical data by using unit values (euro/kg). These percentages are used to estimate the amount of waste products and residuals in the supply and use tables.

The import-export data also need to be divided in residuals and waste products. IMA data are reported as recycled waste or finally disposed of waste. As a default recycled wastes from IMA and the FTS are considered waste products. Disposed wastes from IMA are considered residuals. The above method results in supply and use tables for waste products and residuals. Notice, that the assumption is made that imported or exported waste products were generated as such and do not arise from produced residuals.

As it turns out, due to the adjusted import-export data, the individual tables for products and residuals are no longer balanced. In order to balance the product and residual tables the following procedure is adopted. If the residual balance was larger than zero i.e. a supply surplus (for example: hazardous chemical deposits and residues, 03.1), the amount of production is decreased with the balance amount. In case of a negative balance i.e. a use surplus (for example: non-hazardous glass wastes, 7.1), the amount of absorption is decreased with the balanced amount). As a consequence the waste product tables are balanced by increasing the amount of production or absorption. In order to clarify the balancing procedure, table 6.5 shows the supply and use of the above discussed waste types before and after balancing. The reason to use this method seems very arbitrary. However, changing the amounts of production and absorption is any other way resulted in negative values. Another possibility is to balance the tables by changing the import/export amounts. It was decided not to alter the import/export data because they provide a relative strong indication on the differentiation between products and residuals.

		Production Residuals	Import	Absorption	Export	Balance	Production Waste products	Import	Absorption	Export	Balance
Before balancing	Chemical deposits	331.607	12.145	13.740	26.480	303.533	0	6.060	-	309.592	303.533-
	Glass wastes	531.564	-	711.936	-	180.372-	0	242.463	-	62.091	180.372
After balancing	Chemical deposits	28.074	12.145	13.740	26.480	-	303.533	6.060	0	309.592	-
	Glass wastes	531.564	0	531.564	0	-	0	242.463	180.372	62.091	-

Table 6.5: Supply and use of two types of residuals and waste products before and after balancing.

In order to compile complete supply and use tables for residuals and products, (distinguished into NACE categories) the procedure described in section 6.4 is followed. In the following chapters only the residuals supply and use tables are considered. The reason for the omission of the product supply and use tables is that they are not complete. Only waste products that occur as such at the time of generation are present in the tables. Waste products that arise from a treatment of residuals (for example recycled waste) are not taken into consideration. Due to problems with data on the recyclers we are at the moment not able to set up reliable tables for waste products.

6.6 Distinguishing treatment methods

In order to derive indicators that relate to environmental problems it is important to distinguish waste treatment methods: landfill, incineration and recycling. In order to determine these treatment methods the total domestic absorption is divided in three treatment categories: dumping/discharging (landfill and elsewhere), incineration (including incineration with the purpose of energy recovery) and recycling. The treatment categories are compiled on the basis of the original SenterNovem data on the amounts of treated waste. The share, in percentages, of each treatment method per waste category is calculated. These percentages are applied to the balanced data on residuals. Together with extra information on waste absorption by industry the waste treatment categories are determined. In theory, different treatment methods for each NACE category could be calculated. However, the results of this exercise will be unreliable due to the many assumptions made while compiling the data. In table 6.6 the supply and use of residuals for aggregated waste types is presented. On the supply side a (aggregated) distinction is made in NACE categories, on the use side a distinction between recycling and incineration is made. Residuals destined to be land filled are presented as the environmental indicator of solid waste. In order to keep the table legible, waste types and NACE categories are aggregated to a large extent. Annex 1 and 2 shows the full range of waste types and NACE categories that can be distinguished.

6.7 Conclusions

On the basis of this survey, the current NAMEA waste accounts are extended in several ways. Firstly, the number of reported NACE categories is increased from about 40 to 58. The NACE classification is according to the renewed NAMEA classification. Secondly, about 75 different waste types, divided in hazardous and non-hazardous waste, are distinguished. The categorization of waste types is according to the new European waste regulation (WstatR, European Communities, 2002). This guaranties future data to be in a format that can easily be implemented in the NAMEA waste accounts. Waste categorization according to a harmonized standard facilitates comparisons between countries. Thirdly, another main extension to the current waste accounts is the implementation of cross-boundary waste flows. Finally, a distinction between residuals and waste products is made. As a result complete residual supply and use tables, thus including recycled residuals, can be presented in the NAMEA.

In chapter 4 an overview of the desired features for a new waste account is given. However, due to a lack of time and proper data sources some of these features could not be implemented yet. For now these features are suggested for further development in chapter 7.

In order to get from the original data sources to detailed NAMEA supply and use tables many adjustments to the data had to be made. Some important adjustments were: allocating waste to NACE categories, converting sludge in amounts of dry matter, adding internal final disposal on the use side, allocating eural codes to import and export data, removing transit waste from FTS data, adjusting absorption data for import and export, balancing waste supply and use tables, distinguishing residuals from waste products and balancing residuals supply and use tables. Unfortunately, not all adjustments could be based on reliable estimations. In order to present meaningful data, the supply and use tables need to be aggregated. At the use side a distinction between NACE categories is not recommended.

7. Prospects for future development

1) Illegal waste: Recently newspapers reported a high number of illegal waste transports. Waste transports could be illegal for many different reasons. Illegal transports can be of influence of the waste accounts. For example, if waste was not reported at all or was given the wrong eural code. An attempt can be made to estimate illegal transport and incorporate it into the waste accounts.

2) Alternative approach: The statistical bureau of Norway (Hass *et al*, 2002) proposes a method that determines waste on the basis of the supply of goods. The idea is that every product will end up as waste eventually. With the amount of produced goods and an average life span the amount of produced waste can be estimated. This method could also be used to estimate waste production in the Netherlands. The results can be confronted with the results in the current report. Confronting different sources gives an idea of the error made.

3) Resident principle: In the current survey the resident principle was not taken into account. In the future, an estimate of the waste production by residents abroad and non-residents in the Netherlands might be made on the basis of tourism accounts. It is not expected that applying this principle to the data will result in major changes.

4) Environmental themes: In the current NAMEA the total amount of dumped or discharged waste is regarded the waste indicator. However, some types of waste might be of a bigger problem to the environment than other types of waste. Maybe an indicator could be developed that takes the environmental impact into regard.

5) Monetary waste accounts: Next to the physical waste accounts, monetary waste accounts could be calculated. They would contain information on the internal and external expenditure of waste abatement and waste disposal.

6) Treatment methods: A further distinction is treatment method (internal treatment, external treatment and recovery with the purpose of energy recovery) is desired. In the near future estimations of these treatment methods will be possible on the basis of improved data sources.

7) Analyses: Especially after a time series on solid waste flows is available, the waste data can be analyzed in several ways. For example a structural decomposition analyses can be performed in which annual changes in solid waste are decomposed according to their driving forces (de Haan, 2001).

8. Definitions

Waste: refers to materials for which the generator has no further use for own purpose of production, transformation or consumption, and which he discards, or intends or is required to discard. Wastes may be generated during the extraction of raw materials during the processing of raw materials to intermediate and final products, during the consumption of final products, and during any other human activity. It is irrelevant to the definition of waste whether it may have a commercial value or is capable of economic reutilization. According to this waste definition a list of waste categories and waste types is set up in the Waste Statistics Regulation (European Communities, 2002). Different types of waste are given a so called eural code.

Excluded are:

- Waste directly **recycled** or **re-used** at the place of generation (i.e. establishment);

- Waste materials that are directly discharged into ambient water or air.

The above used definition of waste is used by Statistics Netherlands in statistics on physical waste flows (CBS, 2005b). In order to structure the physical waste accounts according to the national accounting principles, a distinction needs to be made between waste products and residuals. Waste with an economic value to the generator is considered a **waste product**. Waste with no market value to the generator is considered a **residual**. Residuals can even have a negative price since often they bear removal or disposal costs.

Incineration: Two types of incineration are distinguished. The first one is **thermal treatment of waste, not with the purpose of energy recovery**. This kind of treatment occurs mainly in waste incinerators (NACE 90). Although these incinerators sometimes produce energy, the waste treatment process is considered not with the purpose of energy recovery. The second type of incineration is one with the **purpose of generating energy**. This type of incineration often occurs mainly at electricity suppliers (NACE 40). Waste replaces a primary energy source that would otherwise be used to generated energy.

Recycling: the re-introduction of waste materials into the production processes so that they may be re-formulated into new products. For example, the re-introduction of old newsprint into a paper mill as an input into the production of new newsprint is considered recycling. Recycling is including organic recycling but excluding energy recovery.

Recovery: recycling including waste incineration for energy recovery. The term “**hergebruik**” is used by Statistics Netherlands to refer to recovery (thus not to recycling or re-use).

Re-use: occurs when end of life products and equipment or its components are re-introduced into a production (or consumption) process and used as an input in its original form. Glass bottles that are returned to the place of manufacture to be re-filled with new beverage products are an example of the re-use of residuals. All second-hand products are being re-used.

Disposal: incineration (not with the purpose of generating energy), deposition upon any land or discharge into a water body.

Treatment: the physical, thermal, chemical or biological processes, including sorting, that change the characteristics of the waste in order to reduce its volume or hazardous nature, facilitate its handling or enhance recovery. Final treatment results in waste destined for disposal. If treatment is not explicitly mentioned to be final, the term “treatment” refers to non-final treatment like recycling.

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Annex 1

Compound waste (01)	spent solvents (01.1)	
	halogenated (01.11)	h
	non-halogenated (01.12)	h
	acid, alkaline or saline wastes (01.2)	h
		n-h
	used oils (01.3)	
	motor oils (01.31)	h
	other oils (01.32)	h
	spent chemical catalysts (01.4)	h
		n-h
Chemical preparation waste (02)	chemical preparation waste (02)	
	off-specifiaction (02.1)	
	agrochemical waste (02.11)	h
		n-h
	unused medicines (02.12)	h
		n-h
	paints, varnish, inks and adhesive wastes (02.13)	h
		n-h
	other (02.14)	h
		n-h
	other (02.2, 02.3)	h
	packaging polluted (02.33)	h
Other chemical waste (03)	chemical deposits and residues (03.1)	h
		n-h
	industrial effluent sludges (03.2)	h
		n-h
Health care and biological wastes (05)	health care and biological wastes (05)	h
		n-h
Metallic wastes (06)	metallic wastes (06)	
	ferro (06.1)	n-h
	non-ferro (06.2)	
	precious metal (06.21)	h
	aluminium (06.23)	n-h
	copper (06.24)	n-h
	lead (06.25)	n-h
	other metal (06.26)	n-h
	mixed (06.3)	h
		n-h
Non-metallic waste (07)	glass wastes (07.1)	h
		n-h
	paper and cardboard wastes (07.2)	
	packaging (07.21)	n-h
	other (07.22)	n-h
	rubber wastes (07.3)	
	tyres (07.31)	n-h
	plastic wastes (07.4)	
	packaging (07.41)	n-h
	other (07.42)	n-h
	wood wastes (07.5)	
	packaging (07.51)	n-h
	other (07.52, 7.53)	h
		n-h
	textile wastes (07.6)	
	worn clothing (07.61)	n-h
	other (07.62, 7.63))	n-h
	waste containing PCB (07.7)	h

Discarded equipment (08)	discarded equipment (08)	
	discarded vehicles (08.1)	h
	discarded electrical and electronic equipment (08.2)	h
		n-h
	discarded machines and equipment components (08.4)	
	batteries and accumulators wastes (08.41)	h
		n-h
	other (08.43)	h
Animal and vegetable wastes (09)	waste of food preperation and products (09.1)	
	animal waste of food preparation and products (09.11)	n-h
	vegetal waste of food preparation and products (09.12)	n-h
	mixed waste (09.13)	n-h
	green waste (09.2)	n-h
	animal faeces, urine and manure (09.3)	n-h
Mixed ordinary waste (10)	household and similar wastes (10.1)	
	household waste (10.11)	n-h
	bulky waste (20 03 07)	n-h
	other	n-h
	street cleaning waste (10.12)	n-h
	mixed and undifferentiated materials (10.2)	
	mixed packaging (10.21)	n-h
	other (10.22)	h
		n-h
	sorting residues (10.3)	h
		n-h
Common sludge (11)	waste water treatment sludges (11.1)	
	sludges treatment public sewage water (11.11)	n-h
	biodegradable sludge treatment other waste water (11.12)	n-h
	sludges purification drinking and process water (11.2)	n-h
	dredging spoils (11.3)	n-h
	cesspit contents (11.4)	n-h
Mineral waste (12)	construction and demolition waste (12.1)	
	concrete, bricks and gypsum waste (12.11)	h
		n-h
	other (12.12, 12.13)	h
		n-h
	asbestos waste (12.2)	h
	mineral wastes (12.3, 12.5)	h
		n-h
	combustion waste (12.4)	
	waste from flue gas purification (12.41)	h
		n-h
	slags and ashes thermal treatment and combustion (12.42	h
		n-h
	contaminated soils and polluted dredging spoils (12.6)	h
solidified, stabilized and vitrified wastes (13)	solidified, stabilized and vitrified wastes (13)	h / n-h

Annex 1: Waste categories distinquised in the new waste accounts according to WStatR. (h = hazardous, n-h = non-hazardous).

Annex 2

Description	Classification code
Households transport	
Households other	
Arable farming	01.11
Horticulture	01.12
Live stock	01.2
Other agriculture	01.3-01.5, 02
Fishing	05
Crude petroleum and natural gas production	11
Other mining and quarrying	10, 14
Manufacture of food products, beverages and tobacco	15, 16
Manufacture of textile and leather products	17, 18, 19
Manufacture of wood and wood products	20
Manufacture of paper and paper products	21
Publishing and printing	22
Manufacture of petroleum products; cokes, and nuclear fuel	23
Manufacture of basic chemicals and man-made fibres	24.1, 24.7
Manufacture of chemical products	24.2-24.6
Manufacture of rubber and plastic products	25
Manufacture of other non-metallic mineral products	26
Manufacture of basic metals	27
Manufacture of fabricated metal products	28
Manufacture of machinery and equipment n.e.c.	29
Manufacture of electrical and optical equipment	30-33
Manufacture of transport equipment	34, 35
Other manufacturing	36
Recycling	37
Electricity and gas supply	40
Water supply	41
Construction of buildings	45.2.1.1, 45.2.1.3, 45.2.2
Civil engineering	45.2.1.2, 45.2.3, 45.2.4
Building installation and completion	45.25, 45.3, 45.4, 45.5
Trade and repair of motor vehicles/cycles	50
Wholesale trade (excl. motor vehicles/cycles)	51
Retail trade and repair (excl. motor vehicles/cycles)	52
Hotels and restaurants	55
Land transport	60
Water transport	61
Air transport	62
Supporting transport activities	63
Post and telecommunications	64
Banking	65
Insurance and pension funding	66
Activities auxiliary to financial intermediation	67
Real estate activities	70
Renting of movables	71
Computer and related activities	72
Research and development	73
Legal and economic activities	741
Architectural and engineering activities	742
Advertising	744
Activities of employment agencies	745
Other business activities	74.3, 74.6-74.9
Public administration and social security	75
Defence activities	75.2.2
Subsidized education	80
Health and social work activities	85
Sewage and refuse disposal services	90
Recreational, cultural and sporting activities	92
Private households with employed persons	95
Other service activities n.e.c.	91, 93

Annex 2: Industrial categories distinguished in the new waste accounts.

Waste types (eural code)	Dangerous (h) or non-dangerous (n-h)	Households	Agriculture, forestry and fishing 01-05	Mining and quarrying 10-14	Manufacturing 15-37	Electricity, gas and water supply 40-41	Construction 45	Trade and repair, hotels and restaurants 50-55	Transport 60-64	Sewage and refuse disposal services 90	Other services 65-99 (excl. 90)	Total domestic production	Import	Total supply	Absorption: Recycling	Absorption: Incineration	Export	Contribution environmental theme: Landfill
Spent solvents (01.1)	h	0	15	3.567	267.248	41	694	13.754	2.390	2.625	5.073	295.409	20.811	316.220	114.129	120.812	81.275	4
Acid, alkaline or saline wastes (01.2)	h	0	15	916	79.770	519	154	2.545	1.251	395	3.694	89.259	3.577	92.836	8.058	338	79.448	4.992
	n-h	0	8	10	1.771	1	4	145	17	141	62	2.158	0	2.158	1.282	12	0	863
Used oils (01.3)	h	0	1.693	568	19.367	580	2.009	30.201	7.248	1.091	4.651	67.408	3.215	70.623	38.406	2.638	29.529	50
Spent chemical catalysts (01.4)	h	0	0	10	3.882	0	1	161	0	561	9	4.623	0	4.623	749	58	3.685	132
	n-h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemical preparation waste (02)	h	0	187	2.551	38.272	85	2.953	7.095	2.038	4.724	12.563	70.467	1.501	71.968	25.035	17.338	28.618	977
	n-h	0	2	0	17.017	3	79	560	251	66	893	18.871	1	18.872	10.510	2.938	0	5.424
Chemical deposits and residues (03.1)	h	0	335	1.919	9.619	61	481	4.457	8.711	764	1.727	28.074	12.145	40.220	254	13.474	26.480	12
	n-h	0	3	8	165.440	65.303	56	387	1.977	36	1.500	234.709	0	234.709	172.168	53.366	0	9.175
Industrial effluent sludge (03.2)	h	0	21	15.861	28.451	32	6.648	1.288	52.740	1.176	120	106.337	57	106.394	34.146	24.353	35.264	12.631
	n-h	0	197	734	171.833	76	617	6.190	2.559	11.465	941	194.612	0	194.612	142.046	31.796	11.440	9.330
Health care and biological wastes (05)	h	0	17	0	328	0	9	278	3	19	6.388	7.043	1.519	8.562	0	8.562	0	0
	n-h	0	0	0	1	0	0	0	39	1	2	43	0	43	0	43	0	0
Metallic wastes (06)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ferro (06.1)	n-h	0	0	0	12.886	0	0	0	0	3.350	0	16.236	0	16.236	16.236	0	0	0
non-ferro (06.2)	h	0	0	0	68	0	0	0	0	0	0	68	0	68	66	0	3	0
	n-h	0	0	0	23	0	55	433	1	0	122	634	0	634	588	46	0	0
mixed (06.3)	h	0	0	0	69	0	1	48	43	5	7	172	24	196	184	0	0	12
	n-h	11.393	0	177	68.733	0	0	14.472	2.832	1.593	10.277	109.477	19.155	128.632	99.382	0	29.250	0
Glass wastes (07.1)	h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	n-h	348.304	0	0	106.816	0	0	46.216	1.002	167	29.058	531.564	0	531.564	526.709	2.656	0	2.199
Paper and cardboard wastes (07.2)	n-h	818.637	3.244	0	664.531	0	0	334.333	46.203	1	220.100	2.087.048	0	2.087.048	1.785.540	13.640	285.585	2.282
Rubber wastes (07.3)	n-h	110.537	0	0	1	0	0	242	0	0	34	110.814	0	110.814	110.814	0	0	0
Plastic wastes (07.4)	n-h	1.297	9.385	9	53.961	1	19	15.649	2.254	74	7.445	90.093	0	90.093	66.384	6.621	11.890	5.198
Wood wastes (07.5)	h	0	21	0	0	0	0	1.373	868	3.591	1.339	7.191	18.207	25.398	358	148	24.786	106
	n-h	225.877	0	2.003	444.637	0	0	66.894	32.047	6.597	37.054	815.109	0	815.109	5.739	308.923	500.235	212
Textile wastes (07.6)	n-h	31.854	0	0	19.372	0	1	667	0	14	1.878	53.787	128	53.915	40.425	6.501	4.611	2.378
Waste containing PCB (07.7)	h	0	0	0	328	881	12	3	37	16	142	1.419	1.735	3.154	240	2.792	122	0
Discarded equipment (08)	h	287.878	170	66	2.793	102	1.419	26.302	1.507	1.932	6.862	329.030	1.425	330.455	248.462	4.655	40.274	37.063
	n-h	90.776	0	0	407	0	7	3	1	0	18	91.211	27.376	118.587	93.502	9.628	5.880	9.577
Waste of food preparation and products (09.1)	n-h	1.342.760	1.768.064	1	6.151.582	0	39	38.096	3.103	8.049	26.060	9.337.755	3.361	9.341.116	8.224.114	913.561	86.129	117.312
Green waste (09.2)	n-h	379.064	0	0	1.051.693	0	0	0	0	627.009	0	2.057.765	16.055	2.073.820	2.030.176	31.042	764	11.838
Animal faeces, urine and manure (09.3)	n-h	0	2.047.470	0	184	0	0	0	0	0	0	2.047.654	37.891	2.085.545	1.821.973	12.943	250.629	0
Household and similar wastes (10.1)	n-h	4.631.732	0	4.013	691.489	7	0	1.045.387	149.302	370.469	907.393	7.799.792	599	7.800.391	1.209.519	5.465.548	8.495	1.116.829
Mixed and undifferentiated materials (10.2)	h	0	9	0	451	1	0	5	4.475	9	22	4.972	0	4.972	534	75	4.336	27
	n-h	5.970	11	1	600.070	217	14	84.345	94.886	2	91.387	876.904	58	876.962	378.348	9.034	486.006	3.574
Sorting residues (10.3)	h	0	0	0	33.565	0	1.687	24.224	36.872	53.678	35.228	185.255	0	185.255	122.361	2.474	4.748	55.673
	n-h	0	0	0	127.458	0	0	0	0	136.899	0	264.358	0	264.358	0	0	264.357	1
Waste water treatment sludge (11.1)	n-h	0	0	4	70.175	0	0	54	0	343.998	0	414.230	2.087	416.317	61.696	221.685	121.364	11.572
Sludge purification drinking and process water (11.2)	n-h	0	0	0	3	25.581	0	0	0	0	0	25.584	3.529	29.113	23.638	0	0	5.475
Dredging spoils (11.3)	n-h	0	0	34.554	0	0	5.763	0	0	4.541	34.807	79.664	0	79.664	41.033	0	0	38.631
Cesspit contents (11.4)	n-h	0	0	0	250	0	5	3	1	7.606	10	7.875	0	7.875	3.214	1.047	0	3.614
Construction and demolition waste (12.1)	h	0	555	149	9.087	16	6.432	8.583	6.626	42.794	3.330	77.571	14.086	91.657	57.427	15.152	0	19.079
	n-h	91.574	0	1.003	752.514	0	23.789.689	0	908	346	0	24.636.034	0	24.636.034	22.806.001	80.339	1.118.157	631.537
Asbestos waste (12.2)	h	16.078	302	65	1.422	339	10.672	1.459	2.425	6.150	8.687	47.598	105	47.703	112	25	108	47.458
Mineral wastes (12.3, 12.5)	h	0	1	962	18.142	26	4.444	570	840	1.339	2.794	29.119	0	29.119	20.664	521	0	7.935
	n-h	468.796	37	149.183	1.165.201	23.079	7.559	1.679	23.012	47.009	53.418	1.938.973	705	1.939.678	1.414.591	9.558	241.281	274.248
Combustion waste (12.4)	h	0	0	203	71.886	11.544	0	177	206	157.582	2.804	244.403	190.930	435.333	152.295	35.191	9.404	238.443
	n-h	0	0	0	2.331.903	1.379.070	919	3	0	873.805	2	4.585.702	0	4.585.702	4.467.301	288	104.053	14.060
Contaminated soils and polluted dredging spoils (12.6)	h	0	4	7	7.222	0	8.856	1.086	160	2.952	16.659	36.946	90.229	127.175	40.252	6	81.731	5.186
TOTAL		**8.862.526**	**3.831.769**	**218.542**	**15.261.921**	**1.507.565**	**23.851.298**	**1.779.365**	**488.833**	**2.724.642**	**1.534.560**	**60.061.022**	**470.511**	**60.531.533**	**46.416.663**	**7.429.824**	**3.979.936**	**2.705.109**

Table 6.6: Supply and use of residuals, 2003.

Remarks:
The views expressed in this paper are those of the author and do not necessarily reflect the policies of Statistics Netherlands.

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