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Classification of physical flows

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Issue paper on classification of physical flows

- Issue 2 –

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A. Introduction

1. This issue paper discusses the classification of physical flows in the SEEA-2003 and puts forward a proposal for changing the classification for discussion. It addresses issue nr. 2 of the issue list for the SEEA revision.

2. Previous issue papers in particular to 'Classification of Physical Flows' (LG/12/7) and 'Classification of Physical Flows: Part II' (LG/13/1) by Statistics Netherlands, and Classifications of Material Flows for SEEA-MFA (LG/13/3) by Karl Schoer had been discussed by the London Group. The papers prepared by Statistics Netherlands raise the issue of distinguishing waste products from waste residuals according to whether they have a positive value or not. The paper by Karl Schoer already includes a proposal for the classification of physical flow harmonized with MFA principles.

3. An earlier presentation containing our main ideas was given at the 13th Meeting of the London Group on Environmental Accounting. This paper attempts to clarify some of the issues discussed in the previous papers, in particular it proposes (a) a definition of waste that is consistent with the definition used in other frameworks and international statistical standards, namely the Central Product Classification, the SNA and the European Waste Classification (EWC) ; (b) the use of CPC for all physical flow, except for the case of waste, complemented by additional items that are not covered by CPC because they are not transacted within the economy; (c) use EWC as classification of waste replacing CPC 39 – *Waste and scrap* related to solid waste. This paper has been prepared to seek the view of the London Group. The outcome of the discussions at the London Group meeting will be brought to the United Nations Expert Group Meeting on Classifications for their views.

4. A short description of the issue is presented in section B. Section C provides an overview of the different definitions and concepts used in statistical standards and frameworks for products, by-products, residuals and waste. Section D presents the physical flows related to waste and the possible options for the scope of the waste accounts. In section E proposals for changes are put forward.

5. Classifications of physical flows, including a proposal for the revised SEEA and the results of an attempt to develop a correspondence between the CPC 2.0 and the EWC Stat are presented in the Annexes.

B. Description of the issue

6. The SEEA-2003 distinguishes four types of physical flows: natural resources, ecosystem inputs, products, and residuals. These flows are organized into 3 separate classifications:

- Ecosystem inputs, which represent the services provided by the ecosystems to the economy are classified according to the SEEA asset classification;
- Natural resources, which represent the material input from the environment to the economy are classified according to the SEEA asset classification;
- Physical product flows, which represent the flows of goods and services within the economy (except for waste) are classified according to CPC;
- Residuals, which represent the undesired outputs of the economy are classified according to a mix of classifications according to whether they remain within the economy or return to the environment.

7. The conceptual framework of SEEA-2003 that underlies these classifications *roughly*[1] can be explained as follows: the environment supplies natural resources to the economy, which turns these resources – in combination with necessary ecosystem inputs such as oxygen - into products i.e. desired outputs with market value and residuals i.e. undesired outputs without market value; these residuals may be recycled, re-used (this is sometimes called re-absorbed as they remain within the economy) or discharged into the environment (as air emissions or as waste to uncontrolled landfills).

8. The following issues with the classification of physical flows and terminology/definitions the flows in the SEEA-2003 arise:

- Definition of products, wastes, residual, ecosystem inputs need to be clarified
- Scope of the waste accounts is not clear cut
- Coherence of classifications used for the various flows needs to be ensured.

C. Definitions of products, by-products, waste, and residuals.

9. Table 1 provides an overview of the terminology used to describe outputs of production processes in various frameworks. As we see there appears to be differences but also many commonalities in the use of the terms product, by-product, waste and residual. The revised SEEA being a statistical standard, has to harmonize the definitions with other standards or justify any divergence from other standards/frameworks.

Table 1: Overview of terminology used to describe outputs in different frameworks

Framework	Coverage	Definition
CPC ver. 2	Products	CPC is a comprehensive general-purpose classification of goods and services. The CPC presents categories for all products that can be the object of domestic or international transactions or that can be entered into stocks. It includes products that are an output of economic activity. The CPC in general follows the definition of products within the SNA (CPC Ver.2 preliminary introduction para 19). CPC classifies products on the

[1] As we will see later conflicting definitions of many of these concepts (e.g. residuals) can be found in the SEEA-2003.

			basis of the physical properties and intrinsic nature of the product as well as on the principle of industrial origin. CPC covers products that may not carry any value in some frameworks such as waste products. Although often treated as without value, they are still (unintended) output of a production process and are of interest in statistics and may also need to be measured as inputs into certain processes (waste disposal), often being the only approximation of the volume of the activity (CPC Ver.2 preliminary introduction para 44).
2008 SNA	Products		Goods and services, also called products, are the result of production. They are exchanged and used for various purposes; as inputs in the production of other goods and services, as final consumption or for investment. (para 2.36)
	By-products		The principal activity of an enterprise consists of the principal product and any by-products, that is, products necessarily produced together with principal products.
	Joint-products		When two or more products are produced simultaneously by a single productive activity they are "joint products". Examples of joint products are meat and hides produced by slaughtering animals or sugar and molasses produced by refining sugar canes. (para 5.46)
Waste Framework Directive	Products		All material that is deliberately created in a production process. In many cases it is possible to identify one (or more) "primary" products, which is the principal material produced
	Production residues	By-products	Production residue: a material that is not deliberately produced in a production process but may or may not be a waste. By-product – a production residue that is not a waste.
		Waste	Materials that are not prime products (i.e. products produced for the market) 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. Are excluded: residuals directly recycled or reused at the place of generation (i.e. establishment); waste materials that are directly discharged into ambient water or air
SEEA-2003	Products		Products are goods and services produced within the economic sphere and used within it, including flows of goods and services between the national economy and the rest of the world. (2.31)
	Residuals	Solid waste Liquid waste Gaseous waste	Residuals are incidental and undesired outputs from the economy that have a value of zero (or a negative value) to the generator. Residuals is the single word used in the SEEA to cover all solid, liquid and gaseous wastes. They may be recycled or re-used, or (more usually at present) discharged into the environment. It is important to note that residuals may have a positive value for a unit other than the generator; for example, household waste collected for recycling has no value to the household but may have some value to the recycler. Scrap materials that have a value realizable by the generator (discarded equipment for example) are treated as products and not as residuals (2.31)
Environmental Management Accounting	Product outputs	Products	Product Outputs are physical products, by-products and associated packaging that are delivered to external customers. (p.35)
		By-products	By-products are minor products incidentally produced during the manufacture of the primary product. All by-products that result in earnings are considered, as well as associated by-product packaging. (p.35)
	Non-product outputs	Waste and emissions	Any Output that is not a Product Output is by definition a Non-Product Output (NPO). Examples include solid waste, hazardous waste, wastewater and air emissions. E.g. wastewater is defined to be waste streams whose primary component is water but which also contain contaminants of some kind, such as high biological oxygen demand (BOD), total suspended solids (TSS), nutrients (such as phosphates), excess heat and toxic materials (such as solvents, pesticides or heavy metals). (p.36)

CPC ver. 2

10. CPC version 2 essentially covers all products that are transacted within the economy irrespective of its value. The CPC classifies products based on the physical properties and the intrinsic nature of the products as well as on the principle of industrial origin. The physical properties and intrinsic nature of products are distinguishing characteristics that are proper to the products themselves. These include, for example, the raw materials of which goods are made, the stage of production or the way in which goods are produced or services rendered, the purpose or user category for which products are intended and the prices at which they are sold.

11. The importance of the industrial origin of goods and services was underscored by the attempt to group into one CPC subclass mainly the products that are the output of a single industry. Through their linkage to the criterion of industrial origin, the input structure, technology and organization of production characteristics of products are also reflected in the structure of the CPC. However, it had to be recognized that some products can still be the output of several ISIC industries or one industry may produce products that are very different in nature. In those cases exceptions to the general principles had to be made.

12. CPC ver.2 includes Division 39 *Wastes or scraps.* The Division is further subdivided in the following groups:

391 - Wastes from food and tobacco industry
392 - Non-metal wastes or scraps
393 - Metal wastes or scraps
399 - Other wastes and scraps

13. These groups are further subdivided in classes and class 3991 covers municipal waste. Annex 2 contains the full structure of Division 39. Note also that Group 399 includes waste water.

14. In addition to Division 39, waste also is included in other Divisions and Classes of CPC when the principle of industrial origin prevails. For example in the case of glass, Group 371 *Glass and glass products* includes class 3711 - *Glass in the mass, in balls (except microspheres), rods or tubes, unworked; waste and scrap of glass*. In those cases when waste is explicitly mentioned in the product heading or in the explanatory notes it is possible to identify the relevant waste categories. In most cases however it is difficult as waste is not separately identified (e.g. green waste, unused explosives, discarded equipment).

15. Annex 6 presents the results of an attempt to develop a rough correspondence between EWC Stat and CPC. For some classes it is possible to make a good correspondence, one-to-one or one class of EWC Stat to a small number of CPC classes. For other classes, mostly covering small in volume of waste the correspondence is one class of EWC Stat to many CPC classes.

2008 SNA

16. The definition of product in the SNA is consistent with that of CPC. There is no explicit reference to positive price as a criteria or characteristic, although positive price may be implicitly

assumed as the SNA includes only transactions in monetary terms only. However, the SNA does recognize that some products are transacted at economically insignificant prices (e.g. water).

17. The 2008 SNA does not contain a definition of residual or waste.

SEEA 2003

18. The SEEA-2003 makes the distinction between products and residuals in terms of value to the generator (para. 3.66 calls this the 'price criterion'): *"If any industry, recycling or wholesale, acquires inputs at zero (or near zero) cost, the inputs should be regarded as inputs of residuals. If the inputs for recycling have a positive price, then they should be treated as products and recorded as such (para. 3.131)"* For instance municipal waste would have zero (or negative value) for the generator and therefore be classified as a residual, whereas scraps of paper or metal that could have a positive price would be classified as a product. It is important to note here that SEEA defines waste as a subset of residuals (i.e. the solid part).

19. The underpinning of this idea may have come from the distinction between purchasing a good vs. payment for a service. The former are characterized by positive price (the direction of the physical flow and the flow of money is opposite), the latter are characterized by negative price (the direction of the physical flow and the monetary flow are aligned). For example, in case of municipal waste the generator usually has to pay a price (or municipal tax, levy etc.) in order to get his waste collected. In the CPC this transaction would be classified as *Division 94 - Sewage and refuse disposal, sanitation and other environmental protection services.*

20. Often goods and services are bundled. In the case of water the service and the good are often combined, that is you pay for both the water itself as well as the service of having it delivered. In case of wastewater to sewerage or waste to controlled landfill there are actually two flows that are combined: one has to do with the service of collection, treatment or disposal, the other has to do with the physical flows of waste. CPC records the service in Division 94 and the volume of water in the CPC class 3999 – Other wastes n.e.c. (see annex 2).

21. It should be stressed from the outset that there appears to be no agreed definition of residuals in the SEEA-2003. According to the definition provided in table 1 as well as the classification of residuals (see annex 1) residuals cover both flows from the economy to the environment (e.g. air emissions) as well as flows that remain within the economy (e.g. residuals that are recycled). However, elsewhere the residuals are defined in a restricted sense as flows from the economy to the environment.[2]

22. The SEEA-2003 tries to clarify this issue by distinguishing between gross and net residual flows. *"Water which is piped to a household is a product. Waste water which is discharged to the environment is a residual flow. In between, there is waste water in the sewage system between the point of generation and the point of treatment in a waste water treatment plant. Even though the waste water in the sewage system remains within the economic sphere, it seems difficult to justify calling it a product. But it is also unsatisfactory to classify it as a residual going first to the environment and then reabsorbed by the water treatment plant. The solution is to label the emissions at the point of generation as gross residual flows (in keeping with the discussion earlier, it is not the overall flow that should be so labeled, but the flows of the*

[2] "In the SEEA, the term "residual" is used to encompass all these outflows from the economy which use environmental media as a disposal sink." (para 1.67)

constituent materials in the waste water). The treated emissions (of the individual constituents) from the sewage plant are then to be labeled as net residual flows." (para 3.76.)

23. Moreover, additional issues arise with the SEEA-2003 definition of residual. For example, "dissipative use of products" is a category in the classification of residuals. Dissipative use of products refers to products that are deliberately dissipated into the environment such as fertilizers. These are not 'incidental and undesired' output of a production process but are deliberate and essential inputs in the production process. They can only be seen as a residual if we define residual as flow from the economy to the environment.

24. Finally the SEEA concept of residual could be confused with the EWC concept of production residues which is a lot broader as it also includes by-products.

Waste Framework Directive

25. The waste framework directive (WFD) distinguishes between products and production residues, where the latter are sub-divided into by-products and waste. [3] The distinction between by-products and waste is elaborated in jurisprudence as follows: "*the [European Court of Justice] has set out a three part test that a production residue must meet in order to be considered as a by-product. The court stated that where the further use of the material was not a mere possibility but a certainty, without any further processing prior to reuse and as part of a continuing process of production, then the material would not be a waste. This test is cumulative – all three parts must be met.*" (ibid)

26. It provides several examples:

- *"In the joined cases of Commission v Spain (C-416/02 and C-121/03), the court held that manure will not be waste where it is used as soil fertiliser as part of a lawful practice of spreading on clearly identified parcels (regardless of whether the parcels are within or outside the agricultural holding that generated the effluent) and if its storage is limited to the needs of those spreading operations."(ibid)*

- *"A major use for by-products from the food and drink sector is animal feed. The production processes in numerous sectors (e.g. sugar production, oilseed crushing, starch production and malt production) generate materials that are used as feed material either directly by farmers or by the animal compound feed industry. Although not all production residues destined for animal feed are automatically non-wastes, the above feed materials are produced deliberately in adapted production processes, or may not be produced deliberately but meet the cumulative by-product criteria of the court as their further use in animal feed is certain, without further processing outside of the production process of that material… In both cases, this material can therefore be considered to fall outside of the definition of waste." (ibid)*

27. The WFD states "*it is immaterial to the legal definition of waste whether a substance or object may have a commercial value or is capable of economic reutilization"(ibid).* It is argued that "*a distinction between waste and by-product that is based on whether the material is destined for recovery or disposal, or based on whether or not the material has a positive economic value, would not seem to offer the necessary guarantees for the protection of the environment."*

[3] As elaborated in the Communication from the Commission to the Council and the European parliament on the Interpretative Communication on waste and by-products, 2007.

28. One of the arguments mentioned to keep the value discussion out of the definition of waste is as follows: "*where a manufacturer can sell the material concerned for a profit, this can indicate that it is more likely that such a material will certainly be used.. However, this alone is not definitive – see previous case law confirming that waste can have an economic value... The Commission considers that it is also important to weigh up the costs of treatment of waste when considering this test, as there is a risk that a token price could be offered to have the material classified as non-waste, and therefore allow it to be treated outside of proper waste treatment facilities.*" Simply put, only if the price paid for waste would be higher than the required costs of its waste treatment it could be considered as a by-product.

29. The essence of the definition of waste centers on the notion of discard. As long as something is discarded, regardless of whether it still has value (e.g. including a pearl necklace thrown into a dustbin), and regardless of whether the object can or will be re-used, it is waste.

30. It should be stressed that the WFD has a very broad concept of waste. As we have seen above, this is in part due to the strict criteria it uses for something to be classified as by-product. Another way to look at this is that the notion of discard is interpreted in a broad sense as "intent to discard". Something is waste if you want to get rid of it. If you are lucky you can sell it. Therefore, selling is seen as a form of discarding and not as a way of avoiding discard.

31. This clearly leads to differences with the SEEA definition of waste. For instance in the case of manure mentioned above, if these inputs were obtained for free, this would constitute waste according to the SEEA-2003. When an industry is able to sell its residuals to a third party it would by definition stop being waste according to SEEA, while this is not necessarily so in the WFD.

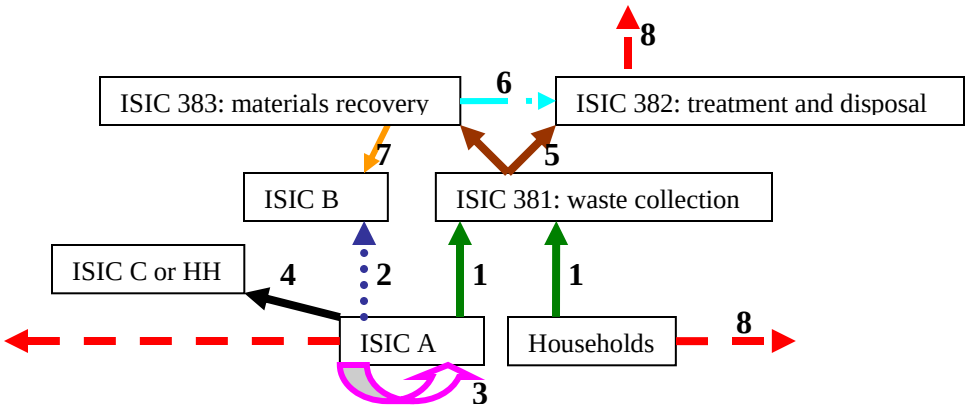
EMA

32. Although the International Guidance Document: Environmental Management Accounting (International Federation of Accountants, 2005) does not provide very precise definitions of product, by-products and waste, it seems to be close to the SEEA ideas. It mentions earnings as a characteristic of by-products. As the handbook also refers to the SEEA, it is not inconceivable that it based its ideas on the SEEA-2003.

D. Physical flows related to waste

33. Figure 1 presents the physical flows related to waste. The diagram will help in better understanding the differences in the coverage of the various frameworks and the coverage of the waste accounts.

Figure 1: Physical flows related to waste



34. The diagram distinguishes several types of physical flows:

- The solid arrows 1 represent physical flows into ISIC 381 (waste collection)[4] covering both 'industrial waste' (originating from ISIC A) and 'household waste' (originating from households).
- The dotted arrow 2 (from ISIC A to ISIC B) presents physical flows of discarded materials that can be used directly as intermediate consumption by other industries.[5]
- The arrow 3 (ISIC A to ISIC) presents materials that are directly recycled or reused at the place of generation (i.e. establishment) such as by incineration.
- The arrow 4 (from ISIC A to ISIC C) represents transactions of products or by-products.
- The arrows 5 (from ISIC 381 to ISIC 382 and ISIC 383) present flows of materials from waste collection (381) to waste treatment and disposal (ISIC 382) or to materials recovery (ISIC 383).
- The arrow 6 (from ISIC 383 to ISIC 382) presents waste from the materials recovery industry. This flow is sometimes also labeled "secondary waste".
- The arrow 7 (from ISIC 383 to ISIC B) presents materials that have been recovered. [6]

[4] Division: 38 - Waste collection, treatment and disposal activities; materials recovery:
381 - Waste collection 3811 - Collection of non-hazardous waste; 3812 - Collection of hazardous waste
382 - Waste treatment and disposal: 3821 - Treatment and disposal of non-hazardous waste; 3822 - Treatment and disposal of hazardous waste
383 - Materials recovery

[5] This is close to (but not necessarily equivalent to) what the LG has called waste products; this seems to be called "niet-afvalstoffen" in Dutch.

[6] Recovery is defined as any waste management operation that diverts a waste material from the waste stream and which results in a certain product with a potential economic or ecological benefit. Recovery mainly refers to the following operations: material recovery, i.e. recycling; energy recovery, i.e. re-use a fuel; biological recovery, e.g. composting; re-use. Direct recycling or reuse within industrial plants at the place of generation is excluded.
Re-use shall mean any operation by which end of life products and equipment (e.g. electrical and electronic equipment) or its components are used for the same purpose for which they were conceived (OECD)

- The arrows 8 present flows from the economy to the environment. The flow from households or ISIC A to the environment could consist of a) flows of material to uncontrolled landfill or b) waste materials that are directly discharged into ambient water or air (e.g. flow of waste water or air emissions as materials are incinerated from the establishment to the environment that by-pass ISIC 38).

Scope of waste accounts

35. The scope of waste accounts seems to differ between the SEEA-2003 and other frameworks. Several options can be considered:

- The narrowest interpretation of waste would restrict it to flows into ISIC 38 (i.e. arrows nr 1). This interpretation seems to be close to the SEEA-2003 where solid waste is seen as a sub-set of residuals defined as undesired outputs that have a value of zero (or a negative value) to the generator.

- A broader interpretation would define waste as flows into ISIC 38 plus flows of discarded materials that are used as intermediate consumption by other industries (i.e. the sum of arrows 1 and 2). This interpretation of waste would be close to the EU concept of waste, although the EU concept also seems to include "secondary waste" (i.e. arrow nr 6).

  This broader interpretation should also include waste discharged to the environment (arrow nr.8), as well as materials directly discharged to ambient water and air. Although explicitly not included in the WFD.

- The widest view would also include materials that are directly recycled or reused at the place of generation i.e. establishment) (arrow nr 3).

36. There appear to be several advantages in aligning the revised SEEA with the EU concept of waste that have mostly to do with data availability. Also the Dutch and the Finnish waste accounts seem to use the broad scope of the EU waste concept.[7] However, there remain a couple of questions:

- Should 'secondary waste' be included in waste accounts? In other words, should waste accounts be gross (i.e. include double counting) or net?

- With a broad definition of waste, is there a need to make a conceptual distinction within the category of waste between waste products and waste residuals or should this be apparent from the supply and use tables? Both the Dutch (waste products and waste

[7] See Physical Flow Accounts Finland: "the border between products and waste is especially difficult for the production residues of primary production and manufacturing. In Finnish physical flow accounts, that waste is defined as final waste which is taken up directly into landfills or to waste treatment of the sewage and refuse disposal industry. All solid or liquid residues of product use by services and households are classified as final waste. The definition of waste by Finnish waste statistics and also by the EC are much wider than this definition of final waste and include the production residuals which go directly for use as raw materials or as fuels. In physical flow accounts this recovered waste is included in the product flows. An important reason for this is that they are also included in the CPA classification of the products of the EU, and thus are included in the product flows of economic statistics and national accounts. However in the detailed classification level of physical flows accounts, recovered waste items have separate classes such that they can be picked up and presented in a separate waste account table. Thus the group of wastes could be further divided into two-sub groups a) ordinary products which are produced intentionally for certain uses and recovered wastes, which are generated as residuals from the production of ordinary products but which have found direct economic uses in the economy."

residuals) and the Finnish waste accounts (recovered products and final waste) make such a conceptual distinction.

37. The discussion on the scope of waste has a parallel in the discussion regarding the definition of wastewater that took place during the development of SEEAW. The SEEAW defines wastewater as: *"water which is of no further immediate value to the purpose for which it was used or in the pursuit of which it was produced because of its quality, quantity or time of occurrence. Wastewater can be discharged directly into the environment (in which case it is recorded as a return flow), supplied to a treatment facility (ISIC 37) (recorded as wastewater to Sewerage) or supplied to another industry for further use (reused water). Total wastewater generated by an economic unit is obtained .. as the sum of the supply of reused water, wastewater to Sewerage and returns into the environment."* The SEEAW therefore defines wastewater in a wide sense including re-used water as well as return flows, but separately identifies what it calls 'waste to sewerage'. It does not include reused water within the same establishment because it is difficult to measure.

38. Likewise, the SEEA could introduce a concept 'waste to ISIC 38' within the category waste. This would be in line with the SEEAW practice. However, this would also imply that waste accounts should contain a breakdown by industries in the use table, which seems to go against current compilation practices that often disaggregate waste by treatment method in the use table.[8]

E. Proposals for change

Definition of products, residuals, ecosystem inputs and waste

39. It is proposed to align the definition of products and by-products with that of the SNA which is fully consistent with CPC. This implies that the definition of residuals is no longer valid, as unintended output of production including waste are products in the SNA and CPC sense regardless of their value.

40. As agreed by the 14th London Group meeting, it is proposed to drop the term ecosystem input because it is difficult to define[9]. It is suggested instead to replace the terms ecosystem inputs and natural resources with the term flows from the environment to the economy. These flows would mostly consist of natural resources which will become products once they enter the economy and as such they can be classified using CPC and additional flows that provide an input to the economy.

41. It is proposed to define waste in accordance with the EU regulations as *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.* Discard means that

[8] The Dutch waste accounts consist of separate supply-use tables for waste products and waste residuals. The use tables are not broken down by industry but by treatment type (incineration, recovery, disposal plus exports). The Finnish waste accounts consist of a supply and use table for all waste broken down into unused extraction, recovered waste and final waste in the supply table and unused extraction, material use energy use final waste, dissipative use in the use table.

[9] Various definitions of ecosystem inputs can be found in the SEEA-2003: positive definitions such as „the water and air necessary for all life forms" (1.67); or negative definitions such as „Ecosystem inputs are restricted to the substances absorbed from the ecosystem for purposes of production and consumption such as the gases needed for combustion and production processes as well as oxygen, carbon dioxide, water and nutrients. Unlike natural resources, ecosystem inputs are not easily identifiable in any of the products to which they contribute" (3.42).

the generator can either on sell the waste to another user that can use it as intermediate consumption in its production process or discharge it to a landfill or discharge it into the environment with or without treatment.

42. Whether waste has or not a positive value will depend on the destination of the waste. If waste is discharged into a landfill the generator will have to pay for the service of collection and treatment if instead the waste is sold to another user it will have a positive price. The supply and use tables will identify the origin and destination of the flow so it would be clear whether waste will have a positive price or not and whether it will stay within the economy or it will be discharged to the environment.

43. The definition of waste proposed is fully aligned with the definition of wastewater in the SEEAW: *water which is of no further immediate value to the purpose for which it was used or in the pursuit of which it was produced because of its quality, quantity or time of occurrence. Wastewater can be discharged directly into the environment (in which case it is recorded as a return flow), supplied to a treatment facility (ISIC 37) (recorded as wastewater to Sewerage) or supplied to another industry for further use (reused water).*

Structure of the classification of physical flows

44. Because of the above considerations, it is suggested to structure the classification of physical flows as follows:

- Flows from the environment to the economy or "inflows" be classified by CPC complemented by additional flows from the environment not covered by CPC (e.g. oxygen for combustion processes and respiration, nitrogen for Haber-Bosch process, carbon dioxide for respiration of cultivated crops, plants, and trees, soil minerals, but also materials that end up in the waste collection system such as green waste and contaminated soils)
- Flows within the economy (products) classified according to CPC and waste classified according to EWC Stat
- Flows from the economy to the environment or "return flows" consisting of:
  - emissions to air
  - emissions to water (e.g. BOD, phosphor i.e. the pollutants in return flows of water, excluding the water)
  - solid waste to uncontrolled landfill classified by EWC if information is available
  - dissipative use
  - dissipative losses[10]
  - return flows of water (excluding the emissions)
  - additional items

45. Different classifications are used to classify different flows: asset classification, CPC and classification of residuals. This creates several inconsistencies and overlaps across the

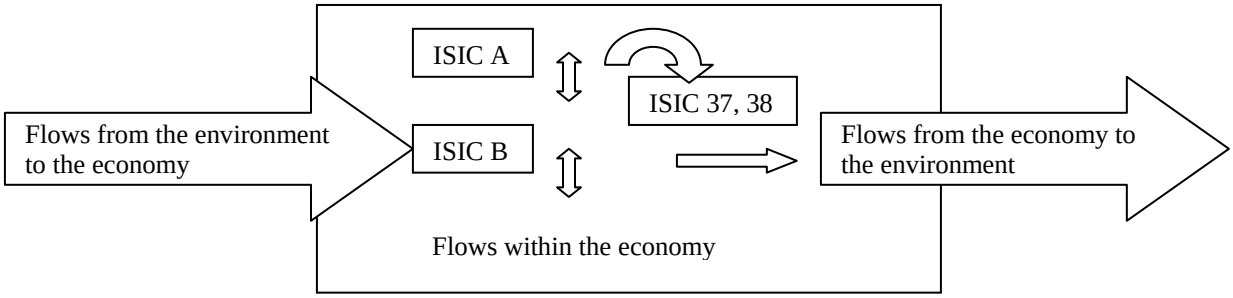
[10] As these items are not transacted they are not covered by the CPC.

classifications. The proposal is to use CPC for all physical flows, when appropriate and integrated it with additional categories to fill in the gaps in particular for flows from the environment to the economy and from the economy to the environment. In addition since CPC is not suited as a classification of waste, selected CPC classes covering waste should be replaced by EWC Stat.

46. As indicated earlier, CPC is in essence a classification of all flows within the economy irrespective of its value. It also includes waste, although waste classes are scattered across many CPC classes in addition to CPC 39 – Waste and scrap. Because CPC uses the principle of industrial origin it is not suited to classify waste which actually is related to the physical characteristic and final consumption. An attempt to link EWC to CPC has shown that the task is not trivial. EWC on the other hand has been designed the specific purpose of classifying waste and therefore it is better suited for that purpose.

47. It is suggested that CPC be used to classify all physical flows within the economy except for waste which should be classified according to EWC Stat. EWC Stat would replace CPC 399 and some additional main CPC classes covering waste (e.g. 3711, etc.) in order to avoid double counting. A proposal for which CPC classes are most relevant for waste is to be discussed by the United Nations Expert Group on Classifications on the basis of the exercise being done by the UNSD Classification experts to develop a correspondence between CPC and EWC Stat presented in Annex 5. The group will meet in the 3rd quarter of 2009.

Figure 2: Proposed framework for classification of physical flows



48. Advantages of this alternative are the following:

- Alignment with CPC 2.0 and 2008 SNA and EWC (waste).
- Integration of EW-MFA as one of the building blocks of SEEA by defining flows from the environment to the economy and return flows explicitly with reference to the boundary between the economy and the environment (comparable with EW-MFA concepts of inputs and outputs respectively).
- Avoiding the difficulty of having dissipative use of products in a classification of residuals; they are simply flows from the economy to the environment.
- This framework is also fully consistent with the SEEAW.

Scope of the waste accounts

49. It is proposed that the waste accounts would cover all flows all flows of discarded materials into ISIC 38 and all flows of discarded material that are used as intermediate consumption by other industries as well as waste that is discharged to the environment (e.g. uncontrolled landfill), including materials discharged to ambient water and air. In fact, materials discharged in ambient air are not included in the SEEAW which only considers pollutants added to water. To ensure complete coverage and the materials discharged, the waste accounts covering all solid waste seem to be logical place to account for materials discharged to any environmental media.

50. Although the EU Waste Framework Directive does not cover material discharged to the environment. This may be very important and relevant in many countries. Therefore the waste accounts should take the broad perspective with the understanding that in some countries discharges of waste in the environment may be insignificant.

51. Furthermore, waste accounts would also include secondary waste that is waste which is generated as a result of material recovery – what was referred to as gross accounting. Although, it may be difficult to obtain the necessary data, the accounting principles need to be respected.

52. This proposal is fully consistent with the recording of wastewater in the SEEAW.

Questions to the London Group

(1) Do you agree with aligning the definition of products with the that of the 2008 SNA and CPC?

(2) Do you agree to use the definition of waste based on EWC?

(3) Do you agree with the alternative typology of flows to distinguish flows from the environment to the economy (inflows), flows within the economy (products and waste), and flows from the economy to the environment (outflows)?

(4) Do you agree to use CPC to classify all physical flows within the economy (except for waste) as well as for the flows from the environment to the economy and from the economy back to the environment complemented by additional categories?

(5) Do you agree to replace CPC Division 39 covering solid waste and possibly the most important CPC classes with EWC Stat for classifying waste?

(6) Do you agree with the suggested expanded scope of the waste accounts to include not only waste all flows of discarded materials into ISIC 38 and used as intermediate consumption by other industries as well as solid waste discharged to the environment (e.g. uncontrolled landfill), including materials discharged to ambient water and air?

Annex 1: SEEA-2003 Classification of residuals

1. Solid waste
1.1 Chemical waste
1.2 Radioactive waste
1.3 Infectious biological waste (human health care etc.)
1.4 Metal waste
1.5 Non-metallic waste
1.5.1 paper waste
1.5.2 glass waste
1.5.3 rubber waste
1.5.4 plastic waste
1.5.5 other
1.6 Discarded equipment
1.7 Slurry and manure
1.8 Animal and vegetable waste
1.9 Mixed ordinary wastes
1.10 Common sludges
1.11 Mineral wastes
1.12 Stabilised waste
1.13 Other waste

2. Emissions to air
2.1 Carbon dioxide (CO2)
2.2 Emissions of acidifying substances
2.2.1 Ammonia (NH3)
2.2.2 Nitrogen oxides (as NO2)
2.2.3 Sulphur oxides (as SO2)
2.3 Metal compounds
2.3.1 Cadmium compounds (as Cd)
2.3.2 Chromium compounds (as Cr)
2.3.3 Other (as Cu, Hg, Ni, Zn etc.)
2.4 Organic compounds
2.4.1 NMVOC
2.4.2 Methane (CH4)
2.4.3 Aromatics (benzene, dioxins, phenols, methane etc.)
2.5 Other residuals
2.5.1 Asbestos
2.5.2 Carbon oxides (CO)
2.5.3 Chlorides
2.5.4 Nitrous oxides (N2O)
2.5.5 Particles
2.5.6 Other

3. Emissions to water
3.1 Eutrophicating substances
3.1.1 Nitrogen compounds (as N)
3.1.2 Phosphor compounds (as P)
3.2 Metal compounds
3.2.1 Cadmium compounds (as Cd)
3.2.2 Chromium compounds (as Cr)

3.2.3 Other (as Cu, Hg, Ni, Zn etc.)
3.3 Organic compounds
3.3.1 NMVOC
3.3.2 VOC
3.3.3 Aromatics (benzene, dioxins, phenols, methane etc.)
3.4 Other residuals
3.4.1 Chlorides
3.4.2 Cyanides
3.4.3 Fluorides
3.4.4 Other compounds

4. Dissipative use of products and dissipative losses
4.1 Dissipative use of products
4.1.1 Dissipative use on agricultural land (fertiliser, etc.)
4.1.2 Dissipative use on roads (thawing and grit materials)
4.1.3 Dissipative use of other kind
4.2 Dissipative losses
4.2.1 Abrasion (tyres, etc.)
4.2.2 Accidents with chemicals
4.2.3 Erosion and corrosion of infrastructures (roads, etc.)

5. Returned water and memorandum items for mass balancing
5.1 Returned water
5.2 Water vapour from combustion (H2O)
5.2.1 From water (H2O) contents of fuels
5.2.2 From hydrogen (H) contents of fuels
5.3 Water evaporation from products
5.4 Respiration of humans and livestock (CO2 and water vapour)

Annex 2: CPC division 39: waste and scraps

391 - Wastes from food and tobacco industry
3911 - Raw offal, inedible (including pigs' bristles, animal guts, bird skins, feathers, bones and ivory)
3913 - Residues of starch manufacture and similar residues
3914 - Beet-pulp, bagasse and other waste of sugar manufacture
3915 - Cocoa shells, husks, skins and other cocoa waste
3916 - Brewing or distilling dregs and waste
3917 - Wine lees; argol
3918 - Tobacco refuse
392 - Non-metal wastes or scraps
3921 - Miscellaneous textile wastes
3922 - Waste of leather, leather dust, powder and flour
3923 - Residual lyes from the manufacture of wood pulp, including lignin sulphonates, but excluding tall oil
3924 - Waste and scrap of paper or paperboard
3925 - Waste, parings and scrap of rubber (except hard rubber) and powders and granules obtained therefrom
3926 - Used pneumatic tyres of rubber
3927 - Waste, parings and scrap of plastics
3928 - Sawdust and wood waste and scrap
3929 – Other non-metal waste or scrap
393 - Metal wastes or scraps
3931 - Slag, dross, scalings and other waste from the manufacture of iron or steel
3932 - Ash and residue (except from the manufacture of iron or steel), containing metals or metallic compounds, except precious metals
3933 - Waste and scrap of precious metal
3934 - Ferrous waste and scrap
3935 - Remelting scrap ingots of iron or steel
3936 - Waste and scrap of copper, nickel, aluminium, lead, zinc and tin
3937 - Vessels and other floating structures for breaking up
3938 - Waste and scrap of primary cells, primary batteries and electric accumulators; spent primary cells, primary batteries and electric accumulators
399 - Other wastes and scraps
3991 - Municipal waste
3992 - Sewage sludge
3993 - Clinical waste
3994 - Waste organic solvents
3995 - Wastes from chemical or allied industries
3999 - Other wastes n.e.c.

Annex 3: Classifications of physical flows according to alternative proposal[11]

Flows from the environment to the economy

MFA code	CPC 2.0	Description
A	0 + 1	**Natural resources**
A.0	0	**Biological resources from agriculture, forestry and fishery**
A.0.1	01	**Resources from agriculture, horticulture and market gardening**
A.0.1.1	011	Cereals
A.0.1.2	012	Vegetables
A.01.3	013	Fruits and nuts
A.0.1.4	014	Oilseeds and oleaginous fruits
A.0.1.5	015	Edible roots and tubers with high starch or inilin content
A.0.1.6	016	Stimulant, spice and aromatic crops
A.0.1.7	017	Pulses (dried leguminous vegetables)
A.0.1.8	018	Sugar crops
A.0.1.9	019	Forage resources, fibres, living plants, cut flowers and flower buds, unmanufactured tobacco, natural rubber, (including crop residues used for animal feed)
A.0.1.10	n.a.	Grazed biomass
A.0.2	02	**Live animals and animal resources (excluding meat)**
A.0.2.1	021	Live animals
A.0.2.2	022-025	Raw milk,eggs and other animal resources (excluding meat)
A.0.3	03	**Forestry resources**
A.0.3.1	031	Wood in the rough
A.0.3.11	0311, 0312	Logs of coniferous wood; Logs of non-coniferous wood
A.0.3.11.a		Logs of coniferous wood; Logs of non-coniferous wood, cultivated[12]
A.0.3.11.b		Logs of coniferous wood; Logs of non-coniferous wood, non-Cultivated
A.0.3.13	0313	Fuel wood, in logs, in billets, in twigs, in faggots or in similar forms
A.0.3.13.a		Fuel wood, in logs, in billets, in twigs, in faggots or in similar forms, cultivated
A.0.3.13.b		Fuel wood, in logs, in billets, in twigs, in faggots or in similar forms, non-cultivated
A.0.3.2	032	Non-wood forest resources
A.0.4	04	**Fish and other fishing resources**
A.0.4.1	041	Fishes, live, fresh or chilled
A.0.4.1.a		Fishes, live, fresh or chilled, cultivated
A.0.4.1.b		Fishes, live, fresh or chilled, non-cultivated
A.0.4.2	042	Crustaceans, not frozen; oysters; other molluscs and aquatic invertebrates, live, fresh or chilled
A.0.4.2.a		Crustaceans, not frozen; oysters; other molluscs and aquatic invertebrates, live, fresh or chilled, cultivated
A.0.4.2.b		Crustaceans, not frozen; oysters; other molluscs and aquatic invertebrates, live, fresh or chilled, non-cultivated

[11] These classification are copied from the paper 'Classifications of Material Flows for SEEA-MFA' LG/13/3 by Karl Schoer.

[12] For all cultivated items the used biomass growth should be recorded rather than the harvest.

A.0.4.9	049	Other aquatic plants and animals
A.0.4.9.a		Other aquatic plants and animals, cultivated
A.0.4.9.b		Other aquatic plants and animals, non-cultivated
A.1	1 (excl.17)	**Ores and minerals, water**
A.1.1	11 (excl. 1102, 1104)	**Coal and lignite, peat (excl. agglomerated coal and lignite)**
A.1.10	110 (excl. 1102, 1104)	Coal and lignite, peat (excl. agglomerated coal and lignite)
A.1.10.1	1101	Coal, not agglomerated
A.1.10.3	1103	Lignite, not agglomerated
A.1.10.5	1105	Peat
A.1.2	12	**Crude petroleum and natural gas**
A.1.20	120	Crude petroleum and natural gas
A.1.20.1	1201	Petroleum oils, and oils obtained from bituminous minerals, crude
A.1.20.2	1202	Natural gas, liquefied or in the gaseous state
A.1.20.3	1203	Bitumeous or oil shale and tar sands
A.1.3	13ex	**Uranuim and thorium ores (excl. concentrates)**
A.1.4	14 ex	**Metal ores (excl. concentrates)**
A.1.4.1	141 ex	Iron ores, other than roasted iron pyrites (excl. concentrates)
A.1.4.2	142 ex	Non-ferrous metal ores (other than uranium or thorium ores), excl. concentrates
A.1.4.2.1	1421 ex	Copper ores (excl. concentrates)
A.1.4.2.2	1422 ex	Nickel ores (excl. concentrates)
A.1.4.2.3	1423 ex	Aluminium ores (excl. concentrates)
A.1.4.2.4	1424 ex	Precious metal ores (excl. concentrates)
A.1.4.2.9	1429 ex	Other non-ferreous metal ores (other than uranium or thorium ores), excl. concentrates
A.1.5	15	**Stone, sand and clay**
A.1.5.1	151	Monumental or building stone
A.1.5.2	152	Gypsium; andrythe; limestone flux; limestone and other calareous stomne, of kind used for the manufacture of lime or cement
A.1.5.3	153	Sands, pebbles, gravel, broken or crushed stone, natural bitumen and asphalt
A.1.5.4	154	Clays
A.1.6	16	**Other minerals**
A.1.6.1	161	Chemical and fertilizer minerals
A.1.6.2	162	Salt and pure soduim chloride; sea water
A.1.6.3	163	Precious and semi precious stones; pumice stone; emery; natural abrasives; other minerals
A.1.8	18	**Water abstraction**
B	n.a.	**Balancing items input side**
B.1	n.a.	Oxygen for combustion processes
B.2	n.a.	Oxygen for respiration of cultivated animals and aquatic resources
B.3	n.a.	Oxygen for human respiration
B.4	n.a.	Nitrogen for Haber-Bosch process
B.5	n.a.	Carbon dioxide for respiration of cultivated crops, plants, and trees
B.6	n.a.	Soil minerals
B.7	n.a.	Unused biomass from parks and gardening for waste collection
B.9	n.a.	Contaminated soils and polluted dredging spoils

Flows from the economy to the environment

MFA Code	Description
A	**Emissions to air**
A.1	**Carbon dioxide (CO_2)**
A.1.1	Carbon dioxide (CO_2) other than from biomass combustion and respiration of humans and livestock
A.1.2	Carbon dioxide (CO_2) from biomass combustion
A.1.3	Carbon dioxide (CO_2) from respiration of humans (balancing item output side)
A.1.4	Carbon dioxide (CO_2) from respiration of livestock (balancing item output side)
A.2	**Methane (CH4)**
A.3	**Dinitrogen oxide (N_2O)**
A.3.1	Dinitrogen oxide (N_2O) other than from dissipative use as a product
A.3.2	Dinitrogen oxide (N_2O) from dissipative use as a product
A.4	**Nitrous oxides (NOx)**
A.5	**Hydroflourcarbons (HFCs)**
A.6	**Perflourocarbons (PFCs)**
A.7	**Sulfur hexaflouride**
A.8	**Carbon monoxide (CO)**
A.9	**Non-methane volatile organic compounds (NMVOC)**
A.9.1	Non-methane volatile organic compounds (NMVOC) other than from dissipative use as a product
A.9.2	Non-methane volatile organic compounds (NMVOC) from dissipative use as a product
A.10	**Sulfur dioxide (SO_2)**
A.11	**Ammonia (NH3)**
A.12	**Heavy metals**
A.13	**Persistent organic pollutantsPOPs**
A.14	**Particles (e.g PM10, Dust)**
B	**Solid waste to uncontrolled landfill**
C	**Emissions to water**
C.1	**Nitrogen compounds (N), excl. emissions from agriculture (dissipative use)**
C.2	**Phosphorus compunds (P), excl. emissions from agriculture (dissipative use).**
C.3	**Heavy metals**
C.4	**Other substances and (organic) materials**
D	**Dissipative use of products n.e.c.**
D.1	**Organic fertilizer (manure)**
D.2	**Mineral fertilizer**
D.3	**Sewage sludge**
D.4	**Compost**
D.5	**Pesticides**
D.6	**Seeds**
D.7	**Other products for dissipative use (e.g. materials spread on roads, solvents)**
E	**Dissipative losses (e.g abrasion from tires, friction products, buildings and infrastructure)**
F	**Return flows of water**
G	**Balancing items output side: water vapor and other water losses**
G.1	Evaporation of water from production processes other than from combustion of fuels or from other excorporated water
G.2	Losses in distribution of water not because of leakages
G.3	Evaporation of excorporated water from fuel combustion
G.4	Other evaporation of excorporated water

Annex 4: Background information and context regarding the WSR, HS and CPC.

Waste Framework Directive

Directive 2006/12/EC is a revised framework for waste management in the EU, aimed at encouraging re-use and recycling of waste as well as at simplifying current legislation. By promoting the use of waste as a secondary resource, the new directive is intended to reduce the landfill of waste as well as potent greenhouse gases arising from such landfill sites.

Waste Statistics Regulation

The Regulation (EC) 2150/2002 on waste statistics obliges the Member States to report statistical data on waste amounts to the European Statistical Office (EUROSTAT). Annex III to this Regulation contains the transposition table between the Waste Statistical Nomenclature (EWC-Stat) and the European List of Wastes (LoW) (formerly the European Waste Catalogue).

European member states are required to compile statistics on the generation of waste for all economic activities and households, for 45 different categories of waste listed in the EWC Stat. In addition they are required to compile statistics regarding the recovery and disposal of waste.

List of Waste

The European List of Waste (LoW) was published in May 2000 based on two previous lists of hazardous and non-hazardous waste respectively. There are about 600 items on this list, which is organized by industry into a 6-digit coding system, where the codes are of the format ## ## ## (3 digit pairs). The first digit pair indicates broad industry class, the second digit pair specifies specific activities whereas the last digit pair indicates wastes that are outputs of these activities.

Waste Statistical Nomenclature (EWC-Stat)

In contrast to the European List of Wastes (LoW) which is mainly source oriented, the Waste Statistical Nomenclature (or EWC-Stat) is described as a "mainly substance oriented waste statistical nomenclature" that rearranges items from the LoW.

The LoW is used in Europe for controlling and monitoring waste streams. For waste statistics the EWC-Stat categories have to be used. But this does not necessarily mean that EWC-Stat has to be used directly at companies' level. The majority of the countries intend to use primarily the LoW for data collection and to transform the collected information into EWC-Stat using the transposition table.[13]

The numeric format is ##.##.#, where '#' denotes a digit. The last digit is either '0' or '1', where '1' indicates hazardous waste.

Harmonized System

The Harmonized Commodity Description and Coding System, usually referred to just as the Harmonized System or HS is a coding system maintained by the World Customs Organization in order to code goods and merchandise that enters into national trade. It is designed to be used for customs purposes and this is reflected in the scope and in the way goods are combined into separate classes. Contrary to the CPC where there is a hierarchical structure linked mostly to the production activities, there is no logic in the order of the products. It therefore has shortcomings as a general goods classification system. Nevertheless, it is fairly detailed and its codes serve as building blocks for the Standard International Trade Classification (SITC) and the Central Product Classification (CPC).

[13] Based upon 'Statistics on generation of waste Annex to the Manual on Waste Statistics' WASTE/WG/43a/5.3.1 (2004)

The categories in HS are organized into Chapters (2 digits), Headings (4 digits) and Codes (6 digits). When referring to a Heading, the format is ##.##. When referring to a Code, the format is ####.##, where the first four digits are those of the heading, but without the separator point.

In addition to the organization into Chapters and Headings, each Heading often contain an internal hierarchical organization that is not reflected in the coding as such, but only becomes apparent when one looks at the full text of the Heading's structure. For this reason, referring to individual HS codes by name is often a meaningless exercise, as the code has to be seen in the context of the Heading to which it belongs.

The HS serves in legally binding international agreements, and its revision process may contain political overtones. This is not the case for UN classifications such as the CPC and ISIC.

The European Combined Nomenclature (CN) is for the most part an extension of HS by two extra digits, although minor coding differences also can be found at the 5th and 6th digit level.

Central Product Classification

The Central Product Classification (CPC) has a scope that can be approximated as being the ensemble of all products (goods and services) exchanged or transacted in the economy. It covers the full scope of the HS, as well as all services, and all those physical items that do not enter international trade (or whose traded value does not qualify for inclusion in the HS as it is below a certain threshold).

The CPC, covering all goods and services, is a system of categories that are both exhaustive and mutually exclusive. This means that if a product does not fit into one CPC category, it must automatically fit into another. Consistent with the other principles used, homogeneity within categories is maximized.

The CPC classifies products based on the physical properties and the intrinsic nature of the products as well as on the principle of industrial origin. The HS uses primarily the criterion of physical properties.

The physical properties and intrinsic nature of products are distinguishing characteristics that are proper to the products themselves. These include, for example, the raw materials of which goods are made, the stage of production or the way in which goods are produced or services rendered, the purpose or user category for which products are intended and the prices at which they are sold.

The importance of the industrial origin of goods and services was underscored by the attempt to group into one CPC subclass mainly the products that are the output of a single industry. Through their linkage to the criterion of industrial origin, the input structure, technology and organization of production characteristics of products are also reflected in the structure of the CPC. However, it had to be recognized that some products can still be the output of several ISIC industries.

CPC operates with 5 digit levels. Its coding format is ##### (i.e. no separators between digits). The 1 digit level is called Section. The 2-digit level is called Division. The 3-digit level is called Group. The 4-digit level is called Class, and the 5-digit level is called the Subclass.

Subclasses of CPC that concern physical goods within the scope of HS are constructed by the aggregation of the respective HS codes. In some cases like agriculture or information products, CPC makes different distinctions than HS and thus the involved HS codes have to be split in the correspondence table. This rarely happens with the subclasses that contain waste, as was discovered when working on the correspondence table of the present report. Therefore, the task of setting up a correspondence table between EWC-Stat and CPC is more or less equivalent to setting up a correspondence table between EWC-Stat and HS.

Annex 5: Complete list of CPC subclasses involved in the linking with EWC-Stat

CPC Ver. 2 subclasses linked to EWC-Stat	
subclass code	**Subclass name**
01620	Tea leaves
01913	Cereal straw, husks, unprepared, ground, pressed, or in the form of pellets
01990	Other raw vegetable materials, n.e.c.
04910	Coral and similar products, shells of molluscs, crustaceans or echinoderms and cuttle-bone
15110	Slate
15320	Pebbles, gravel, broken or crushed stone, macadam; granules, chippings and powder of stone
16390	Other minerals n.e.c.
21180	Flours, meals and pellets of meat or meat offal, inedible; greaves
21291	Flours, meals and pellets, inedible, of fish, crustaceans, molluscs or other aquatic invertebrates
21299	Products n.e.c. of fish, crustaceans, molluscs or other aquatic invertebrates; dead fish, crustaceans, molluscs or other aquatic invertebrates unfit for human consumption
21710	Oil-cake and other solid residues, of vegetable fats or oils
21732	Degras; residues resulting from the treatment of fatty substances or animal or vegetable waxes
23319	Preparations used in animal feeding n.e.c.
23912	Coffee substitutes containing coffee; extracts, essences and concentrates of coffee, and preparations with a basis thereof or with a basis of coffee; roasted chicory and other roasted coffee substitutes, and extracts, essences and concentrates thereof
23925	Cinnamon (canella), processed
23993	Eggs, not in shell, and egg yolks, fresh or preserved; egg albumin
25090	Other manufactured tobacco and manufactured tobacco substitutes; "homogenized" or "reconstituted" tobacco; tobacco extracts and essences
26170	Jute and other textile bast fibres (except flax, true hemp and ramie), processed but not spun; tow and waste of these fibres
26190	Other vegetable textile fibres, processed but not spun; tow and waste of these fibres
26860	Gauze (other than narrow fabrics)
27150	Sacks and bags, of a kind used for the packing of goods
27991	Wadding of textile materials and articles thereof; textile fibres not exceeding 5 mm in length (flock), textile dust and mill neps
28310	Tanned or dressed furskins
31921	Natural cork, debacked or roughly squared, or in blocks, plates, sheets or strip; crushed, granulated or ground cork; waste cork
32113	Mechanical wood pulp; semi-chemical wood pulp; pulps of fibrous cellulosic material other than wood
33500	Petroleum jelly; paraffin wax, micro- crystalline petroleum wax, slack wax, ozokerite, lignite wax, peat wax, other mineral waxes, and similar products; petroleum coke, petroleum bitumen and other residues of petroleum oils or of oils obtained from bitumi
33610	Natural uranium and its compounds; alloys, dispersions, ceramic products and mixtures containing natural uranium and its compounds
33630	Uranium depleted in U235 and its compounds; thorium and its compounds; alloys, dispersions, ceramic products and mixtures containing uranium depleted in U235, thorium or compounds of these products
33720	Spent (irradiated) fuel elements (cartridges) of nuclear reactors
34629	Other phosphatic fertilizers, n.e.c.
34654	Excreta of animals useful for manure/fertilizer and fuel preparation
35110	Paints and varnishes and related products

CPC Ver. 2 subclasses linked to EWC-Stat	
subclass code	**Subclass name**
35420	Glues and gelatine, peptones and their derivatives, and related products; caseinates and other casein derivatives; albuminates and other albumin derivatives
35490	Other chemical products n.e.c.
36270	Articles of vulcanized rubber n.e.c.; hard rubber; articles of hard rubber
37111	Glass in the mass, in balls (except microspheres), rods or tubes, unworked; waste and scrap of glass
38230	Industrial diamonds, worked; dust and powder of natural or synthetic precious or semi-precious stones
38971	Human hair, unworked, whether or not washed or scoured; waste of human hair
39110	Raw offal, inedible (including pigs' bristles, horse hair, animal guts, bird skins, feathers, bones and ivory)
39120	Bran and other residues from the working of cereals or legumes; vegetable materials and vegetable waste, vegetable residues and by-products, whether or not in the form of pellets, of a kind used in animal feeding n.e.c.
39130	Residues of starch manufacture and similar residues
39140	Beet-pulp, bagasse and other waste of sugar manufacture
39150	Cocoa shells, husks, skins and other cocoa waste; coffee husks and skins
39160	Brewing or distilling dregs and waste
39170	Wine lees; argol
39180	Tobacco refuse
39211	Silk waste
39212	Waste of wool or of fine or coarse animal hair
39213	Garnetted stock of wool or of fine or coarse animal hair
39214	Cotton waste, except garnetted stock
39215	Other cotton waste; garnetted stock
39216	Waste of man-made fibres
39217	Worn clothing and other worn textile articles
39218	Rags, scrap twine, cordage, rope and cables and worn out articles of twine, cordage, rope or cables, of textile materials
39220	Waste of leather, leather dust, powder and flour
39230	Residual lyes from the manufacture of wood pulp, including lignin sulphonates, but excluding tall oil
39240	Waste and scrap of paper or paperboard
39250	Waste, parings and scrap of rubber (except hard rubber) and powders and granules obtained therefrom
39260	Used pneumatic tyres of rubber
39270	Waste, parings and scrap of plastics
39280	Sawdust and wood waste and scrap
39290	Other non-metal waste or scrap
39310	Slag, dross, scalings and other waste from the manufacture of iron or steel
39320	Ash and residue (except from the manufacture of iron or steel), containing metals or metallic compounds, except precious metals
39331	Waste and scrap of gold or of metal clad with gold
39332	Waste and scrap of precious metal (except gold) or of metal clad with precious metal (except gold)
39333	Ash containing precious metal or precious metal compounds
39340	Ferrous waste and scrap
39350	Remelting scrap ingots of iron or steel

CPC Ver. 2 subclasses linked to EWC-Stat	
subclass code	**Subclass name**
39361	Waste and scrap of copper
39362	Waste and scrap of nickel
39363	Waste and scrap of aluminium
39364	Waste and scrap of lead
39365	Waste and scrap of zinc
39366	Waste and scrap of tin
39367	Waste and scrap of tungsten, molybdenum, tantalum, magnesium, cobalt, cadmium, titanium, zirconium, beryllium and thallium
39368	Waste and scrap of antimony and chromium
39370	Vessels and other floating structures for breaking up
39380	Waste and scrap of primary cells, primary batteries and electric accumulators; spent primary cells, primary batteries and electric accumulators
39910	Municipal waste
39920	Sewage sludge
39931	Pharmaceutical waste
39939	Other clinical waste
39940	Waste organic solvents
39950	Wastes from chemical or allied industries
39990	Other wastes n.e.c.
41544	Zinc dust, powders and flakes
41601	Tungsten, molybdenum, tantalum, magnesium, cobalt, cadmium, titanium, zirconium, beryllium, gallium, hafnium, indium, niobium, rhenium and thallium, germanium and vanadium, unwrought, and powders thereof, except powders of magnesium; waste and scrap of ga
41603	Bismuth, antimony, manganese, chromium and articles thereof; including waste and scrap of bismuth or manganese
41604	Cermets and articles thereof

Annex 6

EWC Stat, HS and CPC 2.0

There are various reasons why a correspondence table of CPC and the EWC-Stat would be useful. First and foremost is that the EWC Stat covers a subset of the CPC. Context and background information regarding the CPC, HS and the EWC (both the EWC Stat and the List of Waste or LoW) are provided in Annex 4.

The initial plan was to construct a correspondence table between EWC-Stat and HS (and by extension CPC) using a bottom-up approach. The idea was to start with the individual items in the LoW and classify them according to HS. Since we already have the correspondence between LoW and EWC-Stat, this would allow us to automatically generate a correspondence table between EWC-Stat and HS that would be rather comprehensive since all the detail of the LoW had been taken into account. However, as most of the items on the LoW cannot be easily classified according to HS, this approach had to be abandoned.

Instead, a pilot study carried out by Germany was used as basis for the work.[14] The table produced by this study was imported into MS Access, along with HS 2007 – CPC 2.0 correspondence tables. All the CN codes were converted to HS by truncation, and, where additional differences were present, they were identified and corrected. A query was then run to link the EWC-Stat, the HS and the CPC codes together and present them in a common table. This table was sorted according to EWC-Stat codes. The following work then had to be done:

Sometimes, the CN links from the German study were only done at a high level (i.e. 1 or 2 digit level) of the EWC-Stat. Efforts were made to bring these links down to at least the 3-digit level.

The table generated from this automatic process contained significant holes, i.e. large parts of the EWC-Stat classification had no links with HS/CPC at all. Efforts were made to fill in these gaps where possible by identifying additional HS codes containing waste. For this work, the following assumptions and decisions were made.

> The German study was taken as the basis of this work and it was assumed that it covered the majority of codes in CN/HS where waste could be found. Although the work identified even more HS classes containing waste, the bulk of the HS classes involved in the linking table still come from that study.
>
> Only items specifically identified as waste, scrap or similar "unwanted" products in HS were considered. For instance, no efforts were made to link the EWC-Stat code for "used vehicles" with any vehicle class in HS (which would presumably only contain vehicles intended for further use). Similarly, although the LoW has items for various chemicals and these can be classified in HS, these links were not introduced since the HS does not treat these as waste. In some borderline cases, it was decided to include the links after all, for instance in the case of manure.

[14] The pilot study carried out by Germany and presented in 2004 presents a list of those CN codes that had been identified to contain (among other things) waste items. These codes are also associated with the EWC-Stat categories with similar contents. The present draft can be considered an extended "dual" of the German exercise. Rather than providing a systematic list of CN codes with associated EWC-Stat categories, it presents the full list of EWC-Stat categories at the 3-digit level and attempts to identify the corresponding HS codes (and CPC subclasses). In addition to the inversion of the correspondence list, it also includes additional HS codes whose CN equivalents were not identified in the German study.

Results

A total of 90 CPC subclasses could be shown to contain overlap with EWC-Stat. These include all the 48 subclasses in Division 39 – "Wastes or Scraps", as well as another 42 subclasses from various parts of the classification, of which a significant part were outputs from the agriculture or food sectors. The complete table with all CPC subclasses linked to the EWC Stat is included below.

The list found below is a rough approximation of a correspondence table between the EWC-Stat on one side and the HS Nomenclature / CPC on the other side. It attempts to identify, for each 3-digit category in EWC-Stat, the HS codes (and by extension the CPC subclasses) with overlapping scopes.

There are several reasons why only a rough approximation is feasible at this time:

Differences in concepts and scope make it very difficult to develop something anywhere near a complete correspondence table. Even if it could be done (which is unlikely), the usefulness of such an exercise might be limited as there would be a large number of multiple links in both directions, many of which would be of little practical significance.

Even with the guidance document provided by Eurostat[15], in many cases there is just too little information available to clearly identify the boundaries between EWC-Stat categories. The links with the source or industry-oriented LoW provides some additional information, but the items on this list are only occasionally classifiable according to HS.

There is no straightforward or systematic way of identifying waste items in the HS. They are scattered all over the range of codes, and are often hidden as minor items inside codes mainly concerned with other merchandise. A naïve search through explanatory notes and indexes after words like 'waste' can be useful, but does not guarantee that all codes containing waste items are identified. The reason for this is that waste items are not always explicitly referred to using the word 'waste'. To complicate matters further, a significant number of items in the HS index are available in French only. The identifying process therefore becomes a combination of heuristic searches, guesswork, past experience, gut feeling and luck.

It has not been attempted to provide exhaustive coverage of the EWC-Stat classes. A link with a HS code simply means that some degree of overlap in contents has been detected, but says nothing about how big this overlap is. The scope of an EWC-Stat class is not necessarily fully covered by the suggested links with HS. Although there might be several suggested links to HS for a given EWC-Stat class, they are not guaranteed to cover more than a fraction of its full scope.

In a few cases, a really good overlap could be found, where the EWC-Stat class seems to be fully covered by a HS code and vice versa. This is duly indicated in the comment field of the correspondence table below.

Conclusion

Although it is in theory possible to develop a complete correspondence between relevant waste categories of CPC and the EWC, this proves difficult in practice. Waste is scattered throughout the CPC: either it is explicitly identified as waste within the waste or scraps division, or it is

[15] WASTE/WG/43a/5.3.1 (2004)

separately identified as waste but in the relevant product heading (for instance in case of glass waste, radioactive waste, some of the textile waste, the animal and vegetal waste), or it is not separately identified as waste at all (e.g. green waste, unused explosives, discarded equipment). It should also be noted that construction and demolition waste is included in the CPC under municipal waste.

CPC is not the appropriate classification for waste. Its underlying principles do not make it suitable for classifying waste. We suggest classifying waste according to the EWC Stat and to use the EWC Stat for compiling waste accounts.

In case data classified according to the EWC Stat need to be assigned to CPC classes the approximate correspondence table could be used (with caution). However, care should be made with respect to double counting especially in classes that combine both the product and waste.

Approximate correspondence table between EWC-Stat and HS/CPC

EWC-Stat Code	EWCStat Title	HS07	HS link present in German study	CPC Ver.2 Code	CPC Ver. 2 Description	Comment
01	**compound wastes**	3825.50	TRUE	39950	Wastes from chemical or allied industries	
01.1	Spent solvents	3825.41	TRUE	39940	Waste organic solvents	In this case, the EWC-Stat code and the CPC subclass seem to be similar in scope.
		3825.49	TRUE			
01.2	Acid, alkaline or saline wastes	3804.00	TRUE	39230	Residual lyes from the manufacture of wood pulp, including lignin sulphonates, but excluding tall oil	
01.3	Used oils	2710.99	TRUE	39950	Wastes from chemical or allied industries	
01.4	Spent chemical catalysts	2620	FALSE	39320	Ash and residue (except from the manufacture of iron or steel), containing metals or metallic compounds, except precious metals	Based on the following entries in the CPC and HS indexes: CPC index: Catalysts, spent, usable only for the extraction of metal or the manufacture of chemicals (excl. worn out or damaged articles of precious metal) HS Index (French only): catalyseurs épuisés contenant des métaux communs ou leurs composés, utilisables uniquement pur l'extraction du métal ou pour la fabrication de produits chimiques
		7112.91	FALSE	39331	Waste and scrap of gold or of metal clad with gold	catalysts containing platinum
		7112.92	FALSE	39332	Waste and scrap of precious metal (except gold) or of metal clad with precious metal (except gold)	catalysts containing gold
02	**Chemical preparation wastes**					
02.1	Off-specification chemical wastes	2620.60	FALSE	39320	Ash and residue (except from the manufacture of iron or steel), containing metals or metallic compounds, except precious metals	wastes containing mercury
		3006.92	FALSE	39931	Pharmaceutical waste	
		3825.50	FALSE	39950	Wastes from chemical or allied industries	

		3825.61	FALSE			
		3825.69	FALSE			
02.2	Unused explosives	-				Cannot find any reference in HS to used explosives, waste fireworks, waste ammunition, etc.
02.3	Mixed chemical wastes	3825.61	FALSE	39950	Wastes from chemical or allied industries	
		3825.69	FALSE			
03	**Other chemical wastes**	2713.90	TRUE	33500	Petroleum jelly; paraffin wax, micro-crystalline petroleum wax, slack wax, ozokerite, lignite wax, peat wax, other mineral waxes, and similar products; petroleum coke, petroleum bitumen and other residues of petroleum oils or of oils obtained from bitumi	
		3824.90	TRUE	35490	Other chemical products n.e.c.	
		2620.21	TRUE	39320	Ash and residue (except from the manufacture of iron or steel), containing metals or metallic compounds, except precious metals	
		3825.61	TRUE	39950	Wastes from chemical or allied industries	
		3825.69	TRUE			
		3825.90	TRUE	39990	Other wastes n.e.c.	
03.1	Chemical deposits and residues	-				
03.2	Industrial effluent sludges	-				
04	**Radioactive wastes**					
	Nuclear waste	2844.10	TRUE	33610	Natural uranium and its compounds; alloys, dispersions, ceramic products and mixtures containing natural uranium and its compounds	A refinement in the CN code specifies "waste and scrap of natural uranium". Waste and scrap not specifically mentioned in HS text though.

		2844.30	FALSE	33630	Uranium depleted in U235 and its compounds; thorium and its compounds; alloys, dispersions, ceramic products and mixtures containing uranium depleted in U235, thorium or compounds of these products	
		2844.50	FALSE	33720	Spent (irradiated) fuel elements (cartridges) of nuclear reactors	
04.2	Spent ionising sources	-				
04.3	Equipment and products contaminated by radioactivity	-				
04.4	Soils contaminated by radioactivity	-				
05	**Health care and biological wastes**	3825.30	TRUE	39939	Other clinical waste	
05.1	Infectious health care wastes	-				
05.2	Non-infectious health care wastes	-				
05.3	Genetic engineering wastes	-				
		-				
06	**Metallic wastes**					
06.1	Ferrous metal waste and scrap	2619	FALSE	39310	Slag, dross, scalings and other waste from the manufacture of iron and steel	relates to the scalings from iron and steel industry
		7204.10	TRUE	39340	Ferrous waste and scrap	
		7204.21	TRUE			
		7204.29	TRUE			
		7204.30	TRUE			
		7204.41	TRUE			
		7204.49	TRUE			

		7204.50	TRUE	39350	Remelting scrap ingots of iron or steel	
06.2	Non-ferrous metal waste and scrap	7112.91	TRUE	39331	Waste and scrap of gold or of metal clad with gold	
		7112.92	TRUE	39332	Waste and scrap of precious metal (except gold) or of metal clad with precious metal (except gold)	
		7112.99	TRUE			
		7112.30	TRUE	39333	Ash containing precious metal or precious metal compounds	
		7404.00	TRUE	39361	Waste and scrap of copper	
		7503.00	TRUE	39362	Waste and scrap of nickel	
		7602.00	TRUE	39363	Waste and scrap of aluminium	
		7802.00	TRUE	39364	Waste and scrap of lead	
		7902.00	TRUE	39365	Waste and scrap of zinc	
		8002.00	TRUE	39366	Waste and scrap of tin	
		8101.97	TRUE	39367	Waste and scrap of tungsten, molybdenum, tantalum, magnesium, cobalt, cadmium, titanium, zirconium, beryllium and thallium	
		8102.97	TRUE			
		8103.30	TRUE			
		8104.20	TRUE			
		8105.30	TRUE			
		8107.30	TRUE			
		8108.30	TRUE			
		8109.30	TRUE			
		8112.13	TRUE			
		8112.52	TRUE			
		8110.20	TRUE	39368	Waste and scrap of antimony and chromium	
		8112.22	TRUE			
		7903.10	TRUE	41544	Zinc dust, powders and flakes	
		7903.90	TRUE			

		8112.92	TRUE	41601	Tungsten, molybdenum, tantalum, magnesium, cobalt, cadmium, titanium, zirconium, beryllium, gallium, hafnium, indium, niobium, rhenium and thallium, germanium and vanadium, unwrought, and powders thereof, except powders of magnesium; waste and scrap of ga	
		8106.00	TRUE	41603	Bismuth, antimony, manganese, chromium and articles thereof; including waste and scrap of bismuth or manganese	
		8111.00	TRUE			
		8113.00	TRUE	41604	Cermets and articles thereof	
06.3	Mixed metal wastes	7112.91	TRUE	39331	Waste and scrap of gold or of metal clad with gold	
		7112.92	TRUE	39332	Waste and scrap of precious metal (except gold) or of metal clad with precious metal (except gold)	
		7112.99	TRUE			
		7112.30	TRUE	39333	Ash containing precious metal or precious metal compounds	
		7404.00	TRUE	39361	Waste and scrap of copper	
		7503.00	TRUE	39362	Waste and scrap of nickel	
		7602.00	TRUE	39363	Waste and scrap of aluminium	
		7802.00	TRUE	39364	Waste and scrap of lead	
		7902.00	TRUE	39365	Waste and scrap of zinc	
		8002.00	TRUE	39366	Waste and scrap of tin	
		8101.97	TRUE	39367	Waste and scrap of tungsten, molybdenum, tantalum, magnesium, cobalt, cadmium, titanium, zirconium, beryllium and thallium	
		8102.97	TRUE			
		8103.30	TRUE			
		8104.20	TRUE			
		8105.30	TRUE			
		8107.30	TRUE			
		8108.30	TRUE			
		8109.30	TRUE			
		8112.13	TRUE			
		8112.52	TRUE			
		8110.20	TRUE	39368	Waste and scrap of antimony and	

		8112.22	TRUE		chromium	
		7903.10	TRUE	41544	Zinc dust, powders and flakes	
		7903.90	TRUE			
		8112.92	TRUE	41601	Tungsten, molybdenum, tantalum, magnesium, cobalt, cadmium, titanium, zirconium, beryllium, gallium, hafnium, indium, niobium, rhenium and thallium, germanium and vanadium, unwrought, and powders thereof, except powders of magnesium; waste and scrap of ga	
		8106.00	TRUE	41603	Bismuth, antimony, manganese, chromium and articles thereof; including waste and scrap of bismuth or manganese	
		8111.00	TRUE			
		8113.00	TRUE	41604	Cermets and articles thereof	
07	**Non-metallic wastes**					
07.1	Glass wastes	7001.00	TRUE	37111	Glass in the mass, in balls (except microspheres), rods or tubes, unworked; waste and scrap of glass	
		3207.40	FALSE	35110	Paints and varnishes and related products	this is where powdered glass goes
07.2	Paper and cardboard wastes	4707.10	TRUE	39240	Waste and scrap of paper or paperboard	CPC and EWCStat code should be more or less equivalent here, although it is hard to verify for sure. The main question is whether fibre/filler/coating sludges from mechanical separation are included in the CPC code.
		4707.20	TRUE			
		4707.30	TRUE			
		4707.90	TRUE			
07.3	Rubber wastes	4004.00	FALSE	39250	Waste, parings and scrap of rubber (except hard rubber) and powders and granules obtained therefrom	this HS code contains rubber tyres that are unfit for retreading or further use.
		4012.20	TRUE	39260	Used pneumatic tyres of rubber	The used tyres in this HS heading might be retreaded
		4017.00	TRUE	36270	Articles of vulcanized rubber n.e.c.; hard rubber; articles of hard rubber	waste of hard rubber
						rubber waste other than tyres and hard rubber
		4004.00	TRUE	39250	Waste, parings and scrap of rubber (except hard rubber) and powders and granules obtained therefrom	
07.4	Plastic wastes	3915.10	TRUE	39270	Waste, parings and scrap of plastics	

		3915.20	TRUE			
		3915.30	TRUE			
		3915.90	TRUE			
07.5	Wood wastes	4501.90	TRUE	31921	Natural cork, debacked or roughly squared, or in blocks, plates, sheets or strip; crushed, granulated or ground cork; waste cork	
		4401.30	TRUE	39280	Sawdust and wood waste and scrap	
07.6	Textile wastes	5601.30	TRUE	26170	Jute and other textile bast fibres (except flax, true hemp and ramie), processed but not spun; tow and waste of these fibres	
		5305	TRUE	26190	Other vegetable textile fibres, processed but not spun; tow and waste of these fibres	
		5803	TRUE	26860	Gauze (other than narrow fabric)	CN has an undercategory of "gauze of silk waste" but not mentioned in HS, and I do not think that would be considered anyway. I think this link should really be omitted.
		6305.10	TRUE	27150	Sacks and bags, of a kind used for the packing of goods	The original CN code refered to "used" sacks and bags. But should these really be considered waste?
		5601.30	TRUE	27991	Wadding of textile materials and articles thereof; textile fibres not exceeding 5 mm in length (flock), textile dust and mill neps	are textile flock and dust/mill neps really considered waste??
		4302.20	TRUE	28310	Tanned or dressed furskins	
		0511.99	TRUE	39110	Raw offal, inedible (including pigs' bristles, horse hair, animal guts, bird skins, feathers, bones and ivory)	German study implies this link as the CN has an undercode for "horse hair". But I think this could just as well (or even better) be put under the animal/vegetal wastes of 09.
		5003.90	TRUE	39211	Silk waste	Does this go to 07.63 or 07.62?
		5103.20	TRUE	39212	Waste of wool or of fine or coarse animal hair	
		5103.30	TRUE			

		5104	FALSE	39213	Garnetted stock of wool or of fine or coarse animal hair	This does not seem to be treated as a waste item in HS, but in CPC it is found in division 39 so I added it.
		5202.10	TRUE	39214	Cotton waste, except garnetted stock	
		5202.91	TRUE	39215	Other cotton waste; garnetted stock	
		5202.99	TRUE			
		5505.10	TRUE	39216	Waste of man-made fibres	
		5505.20	TRUE			
		6309.00	TRUE	39217	Worn clothing and other worn textile articles	
		5601.30	TRUE	39218		
		4115.20	TRUE	39220	Waste of leather, leather dust, powder and flour	
07.7	Waste contaning PCBs	3825.10	FALSE	39910	Municipal waste	HS 3825.10 contains "construction waste", which I assume must also include such waste with PCB.
		2710.91	TRUE	39950	Wastes from chemical or allied industries	2710.91 is the HS code for waste oils containing PCBs (among other)
08	**Discarded equipment**	8908.00	TRUE	39370	Vessels and other floating structures for breaking up	Not clear where to further classify these on the 3 digit level of 08. 08.1 appears to be limited to "vehicles", which I guess will only be land vehicles
08.1	Discarded vehicles	-				
08.2	Discarded electrical and electronic equipment	-				
08.3	Bulky household equipment	-				
08.4	Discarded machines and equipment components	8548.10	TRUE	39380	Waste and scrap of primary cells, primary batteries and electric accumulators; spent primary cells, primary batteries and electric accumulators	It seems like the HS code 8548.10 and the EWCStat 4-digit code 08.41 are fairly equivalent. However, batteries/accumulators that are not considered scrap are found elsewhere in HS.
09	**Animal and vegetal wastes**					

09.1	Waste of food preparation and products	0902.20	FALSE	01620	Tea leaves	HS index mentions tea waste
		0902.40	FALSE			
		1213.00	TRUE	01913	Cereal straw, husks, unprepared, ground, pressed, or in the form of pellets	
		1212.99	FALSE	01990	Other raw vegetable materials, n.e.c.	Carob husks (not mentioned explicitly in the CPC, but according to linking table and explanatory notes, this is probably where it would go.
		0508.00	TRUE	04910	Coral and similar products, shells of molluscs, crustaceans or echinoderms and cuttle-bone	
		2301.10	TRUE	21180	Flours, meals and pellets of meat or meat offal, inedible; greaves	
		2301.20	TRUE	21291	Flours, meals and pellets, inedible, of fish, crustaceans, molluscs or other aquatic invertebrates	
		0511.91	TRUE	21299	Products n.e.c. of fish, crustaceans, molluscs or other aquatic invertebrates; dead fish, crustaceans, molluscs or other aquatic invertebrates unfit for human consumption	
		2304.00	TRUE	21710	Oil-cake and other solid residues, of vegetable fats or oils	
		2305.00	TRUE			
		2306.10	TRUE			
		2306.20	TRUE			
		2306.30	TRUE			
		2306.41	TRUE			
		2306.49	TRUE			
		2306.50	TRUE			
		2306.60	TRUE			
		2306.90	TRUE			
		1522.00	TRUE	21732	Degras; residues resulting from the treatment of fatty substances or animal or vegetable waxes	
		1522.00	TRUE			

2309.90	TRUE	23319	Preparations used in animal feeding n.e.c.	
0901.90	TRUE	23912	Coffee substitutes containing coffee; extracts, essences and concentrates of coffee, and preparations with a basis thereof or with a basis of coffee; roasted chicory and other roasted coffee substitutes, and extracts, essences and concentrates thereof	
0906.20	FALSE	23925	Cinnamon (canella), processed	HS index mentions cinnamon waste. This is a long stretch though.
0408.11	TRUE	23993	Eggs, not in shell, and egg yolks, fresh or preserved; egg albumin	This comes from the German study using CN, where there are undercategories to this code labeled "not suitable for human consumption". However, can we assume that such things would go under this HS code as well?
0408.19	TRUE			
0408.91	TRUE			
0408.99	TRUE			
3502.11	TRUE			
3502.19	TRUE			
2403.91	TRUE	25090	Other manufactured tobacco and manufactured tobacco substitutes; "homogenized" or "reconstituted" tobacco; tobacco extracts and essences	
3502.20	TRUE	35420	Glues and gelatine, peptones and their derivatives, and related products; caseinates and other casein derivatives; albuminates and other albumin derivatives	This comes from the German study using CN, where there are undercategories to this code labeled "not suitable for human consumption". However, can we assume that such things would go under this HS code as well?
0501.00	TRUE	38971	Human hair, unworked, whether or not washed or scoured; waste of human hair	Should this rather be under 05 with health and biological wastes?
0502.10	TRUE	39110	Raw offal, inedible (including pigs' bristles, horse hair, animal guts, bird skins, feathers, bones and ivory)	
0502.90	TRUE			
0505.10	TRUE			
0505.90	TRUE			
0506.10	TRUE			

		0506.90	TRUE			
		0507.10	TRUE			
		0507.90	TRUE			
		0511.99	TRUE			
		2302.10	TRUE	39120	Bran and other residues from the working of cereals or legumes; vegetable materials and vegetable waste, vegetable residues and by-products, whether or not in the form of pellets, of a kind used in animal feeding n.e.c.	
		2302.30	TRUE			
		2302.40	TRUE			
		2302.50	TRUE			
		2308.00	TRUE			
		2303.10	TRUE	39130	Residues of starch manufacture and similar residues	
		2303.10	TRUE			
		2303.20	TRUE	39140	Beet-pulp, bagasse and other waste of sugar manufacture	
		2303.20	TRUE			
		0901.90	TRUE	39150	Cocoa shells, husks, skins and other cocoa waste; coffee husks and skins	
		1802.00	TRUE			
		2303.30	TRUE	39160	Brewing or distilling dregs and waste	
		2307.00	TRUE	39170	Wine lees; argol	
		2401.30	TRUE	39180	Tobacco refuse	
09.2	Green wastes	3101	FALSE	34654	Excreta of animals useful for manure/fertilizer and fuel preparation	HS heading also includes vegetable stuff, therefore the CPC title is misleading. Not sure what other kinds of "green waste" can be included here.
09.3	Animal faeces, urine and manure	3101	FALSE	34654	Excreta of animals useful for manure/fertilizer and fuel preparation	Link included, although manure is not exactly "waste".
10	**Mixed ordinary wastes**					
10.1	Household and similar wastes	3825.10	FALSE	39910	Municipal waste	
10.2	Mixed and undifferentiated materials	3825.10	FALSE	39910	Municipal waste	common sense
10.3	Sorting residues	4705	FALSE	32113	Mechanical wood pulp; semi-chemical wood pulp; pulps of fibrous cellulosic material other than wood	This link concerns screenings. But should they really be considered waste?

		3825.10	FALSE	39910	Municipal waste	EWC code: "non-composted fraction of municipal and similar waste"
11	**Common sludges**	3825.20	TRUE	39920	Sewage sludge	
11.1	Waste water treatment sludges	3825.20	FALSE	39920	Sewage sludge	
11.2	Sludges from purification of drinking and process water	3825.20	FALSE	39920	Sewage sludge	
11.3	Unpolluted dredging spoils	-				do not think this is covered in the HS
11.4	Cesspit contents	3825.20	FALSE	39920	Sewage sludge	
12	**Mineral wastes**					
12.1	Construction and demolition wastes	3825.10	FALSE	39910	Municipal waste	
12.2	Asbestos wastes	2524.90	FALSE	16390	Other minerals, n.e.c.	this HS code contains asbestos, including waste and scrap
12.3	Waste of naturally occurring minerals	2514	TRUE	15110	Slate	common sense
		2517.20	TRUE	15320	Pebbles, gravel, broken or crushed stone, macadam; granules, chippings and powder of stone	
		7105.10	TRUE	38230	Industrial diamonds, worked; dust and powder of natural or synthetic precious or semi-precious stones	
		7105.90	TRUE	38230	Industrial diamonds, worked; dust and powder of natural or synthetic precious or semi-precious stones	
		2525.30	TRUE	39290	Other non-metal waste or scrap	
12.4	Combustion wastes	3103.90	TRUE	34629	Other phosphatic fertilizers, n.e.c.	"Basic slag"
		2621.10	FALSE	39290	Other non-metal waste and scrap	Ash and residues from the incineration of municipal waste
		2621.90	TRUE			
		2618.00	TRUE	39310	Slag, dross, scalings and other waste from the manufacture of iron or steel	
		2619	TRUE			
		2619	FALSE			
		2620.11	TRUE	39320	Ash and residue (except from the manufacture of iron or steel), containing	
		2620.19	TRUE			

		2620.29	TRUE		metals or metallic compounds, except precious metals	
		2620.30	TRUE			
		2620.40	TRUE			
		2620.60	TRUE			
		2620.91	TRUE			
		2620.99	TRUE			
12.5	Various mineral wastes	7105.90	TRUE	38230	Industrial diamonds, worked; dust and powder of natural or synthetic precious or semi-precious stones	
		2619	TRUE	39310	Slag, dross, scalings and other waste from the manufacture of iron or steel	
		2620.11	TRUE	39320	Ash and residue (except from the manufacture of iron or steel), containing metals or metallic compounds, except precious metals	
		2620.19	TRUE			
		2620.29	TRUE			
		2620.30	TRUE			
		2620.40	TRUE			
		2620.60	TRUE			
		2620.91	TRUE			
		2620.99	TRUE			
12.6	Contaminated soils and polluted dredging spoils	-				Nothing found in HS
13	**Solidified, stabilised or vitrified waste**					Nothing found in HS
13.1	Solidified or stabilised waste	3825.20	FALSE	39920	Sewage sludge	Link valid only if stablilised sludge is supposed to be in here rather than under 11.
13.2	Vitrified wastes	-				