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Classification of Physical Flows and Related Solid Wastes

Paper prepared by UNSD

A. Introduction

1. This paper summarizes the deliberations of the London Group on Environmental Accounting in relation to the classification of physical flows, and in particular the classification of wastes for the purposes of the revision of the System of Environmental-Economic Accounting (SEEA 2003). The classification of physical flows was the subject of a paper¹ and discussion at the 14th meeting of the London Group 28 April – 1 May 2009.

2. As part of the process of the revision of the SEEA the outcome of the discussions by the London Group on the classification of physical flows was to be brought to the Expert Group on Classifications for review. However, while progress has been made on the issue an agreement on the classification of physical flows by the London Group for the purposes of the SEEA revision has not yet been finalized.

3. The matter is brought to the attention of the Classifications Expert Group for information and comment. Particular questions for the Expert Group on Classifications to consider are posed at the end of this paper.

B. Current Classifications of Physical Flows

4. The classification and definition of physical flows can be found several frameworks:

- Central Product Classification Version 2 (CPC Ver. 2)
- System of National Accounts 2008 (SNA 2008)
- SEEA 2003
- Waste Framework Directive (WFD): European Waste Commission Statistical Classifications (EWC Stat)²

5. Each of the above frameworks has a different purpose and consequently differences in scope, coverage, and the definitions and terminology used to describe physical flows. These are summarized in Table 1. Annexes 1, 2, 4 and 5 give more detail on specific classifications.

6. As detailed later in this paper, for the purposes of the revised SEEA it has been proposed to use the CPC framework for non-waste material flows and the European Waste Commission statistical classifications for dealing with solid waste classifications, because those classifications allow solid waste outputs to be tracked in greater detail than do the CPC classifications alone. 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 dealing with small volumes of waste) the correspondence is one class of EWC Stat to many CPC classes.

1 Classification of Physical Flows. Bram Edens, Alessandra Alfieri, Odd Andersen and Ralf Becker. See http://unstats.un.org/unsd/envaccounting/londongroup/meeting14/LG14_1a.pdf

² For more detail on the derivation of these classifications see the above paper, Annex 4

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

Framework	Coverage	Definition
CPC version 2	Products	<p>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 basis of the physical properties and intrinsic nature of the product as well as on the principle of industrial origin.</p> <p>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).</p>
2008 SNA	<p>Products</p> <p>By-products</p> <p>Joint-products</p>	<p>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)</p> <p>The principal activity of an enterprise consists of the principal product and any by-products, that is, products necessarily produced together with principal products.</p> <p>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)</p>
Waste Framework Directive	<p>Products</p> <p>Production residues</p> <p>By-products</p> <p>Waste</p>	<p>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</p> <p>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.</p> <p>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.</p>
SEEA-2003	<p>Products</p> <p>Residuals</p> <p>Solid waste</p> <p>Liquid waste</p> <p>Gaseous waste</p>	<p>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)</p> <p>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)</p>

CPC Version 2

7. CPC version 2 essentially covers all products that are transacted within the economy irrespective of 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 the distinguishing characteristics. 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.

8. The importance of the industrial origin of goods and services was underscored by the attempt to group into one CPC subclass 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 is recognized that some products can 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.

9. For example, CPC ver.2 includes Division 39 *Wastes or scraps*. The Division is further subdivided into 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

These groups are further subdivided in classes. For example, class 3991 covers municipal waste.

10. In addition to Division 39, waste also is included in other Divisions and Classes of the 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).

SEEA 2003

11. 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 would 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).

12. The underpinning of this idea may have come from the distinction between purchasing a good versus 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.

13. It should be stressed from the outset that there appears to be no agreed-upon definition of residuals in the SEEA-2003. According to the definition provided in Table 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 (para. 1.67).

14. 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 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.)

15. 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 any flow from the economy to the environment.

Waste Framework Directive

16. The waste framework directive (WFD), the basis for the EWC Stat, distinguishes between products and production residues, where the latter are sub-divided into by-products and waste. 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.*”

17. The Court 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 fertilizer 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)*

18. 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.”*

19. It should be stressed that the WFD has a very broad concept of waste. 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.

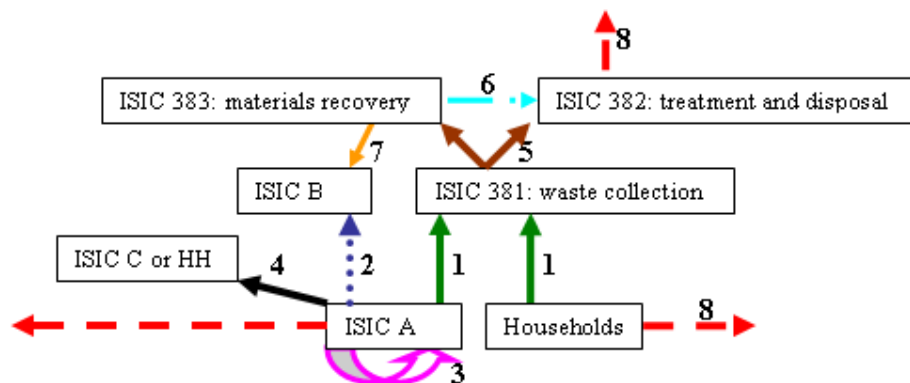
20. This clearly leads to differences with the SEEA definition of waste. For instance in the case of manure mentioned above, if these inputs were obtained for free, this would constitute waste according to the SEEA-2003. When an industry is able to sell its residuals to a third party it would by definition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

21. The EWC Stat framework embodies the principles set out by the WFD for the classification of solid waste. Specific categories of waste under the EWC Stat framework are shown in Annex 5.

C. Physical Flows Related to Solid Waste

22. 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: Flows related to waste



23. Figure 1 distinguishes several types of physical flows:

- The solid arrows 1 represent physical flows into ISIC 381 (waste collection) 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.
- 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 reused at the place of generation (i.e. establishment) such as by incineration.
- 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.
- 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).

- Waste can also be the subject of wholesale trade, which is not indicated in the figure.

The Definition of Solid Waste under Alternative Frameworks

24. The definition of solid waste is different between frameworks:
- The narrowest interpretation of waste would restrict it to flows into ISIC 38 (i.e. arrow 1). This interpretation seems to be close to the SEEA-2003, where solid waste is seen as a subset of residuals, which are 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 6). This broader interpretation should also include waste discharged to the environment (arrow 8), as well as materials directly discharged to ambient water and air, although these materials are explicitly excluded from the WFD.
 - The widest view would also include materials that are directly recycled or reused at the place of generation (arrow 3).

D. Proposal for the SEEA Revision

Definition of Products, Residuals and Solid Waste

25. It is proposed to define solid waste for the purposes of SEEA as “solid materials discarded for the purpose of treatment or disposal.” This definition aligns broadly with the EWC Stat classification categories.

26. While the fundamental concept of a product in the SEEA aligns with the SNA, the SEEA needs an expanded set of classifications for waste. It will be difficult to determine which waste materials remain within the economy and which are ultimately returned to the environment without a more detailed classification system. Tracking these flows is policy relevant for both environmental and waste management purposes.

27. The definition of the term “residuals” in the SEEA 2003 is ambiguous, as discussed in paragraphs 13-15 above. National Statistical Offices, following the SNA, have generally classified materials with a zero or negative value that are left over from production processes as “residuals”, regardless of whether they remain within the economy or are returned to the environment. For policy purposes, however, it is necessary to distinguish between the two destinations.

28. Further, in a measure of physical flows materials must be tracked regardless of their value. For example, physical flows of waste materials may in some cases be used as inputs in the production of products—sewage may be processed to produce fertilizer, mining overburden may be used for construction, and so forth. Even though these inputs

may have no monetary value, they must be tracked in the physical flow accounts in order to preserve the balance of mass. For the purposes of a physical flow account, therefore, it must be possible to identify both waste and products made using waste in accounting for waste flows.

29. It is proposed, therefore, to divide residuals into two types: those that remain in the economy and those that are returned to the environment. Waste as defined under this proposal may fall into either category. Residuals remaining in the economy may also include some materials that are inputs into new products. However, the need to track all output, both products and waste, in the physical flow accounts requires that all residuals be accounted for in terms of their ultimate destination.

Concordance between the CPC and the EWC Stat Frameworks

30. The underlying principles of the CPC make it unsuitable for classifying solid waste, because it does not easily allow waste materials to be tracked to their ultimate destination in the economy or the environment. Instead, it is suggested to classify solid waste according to the EWC Stat and to use the EWC Stat for compiling solid waste accounts.

31. Although it is in theory possible to develop a complete correspondence between the relevant waste categories of CPC and EWC Stat, 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 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.

32. If data classified according to the EWC Stat need to be assigned to CPC classes the approximate correspondence table shown in Annex 6 could be used (with caution). However, care should be taken with respect to double counting, especially in classes that combine both products and waste.

Summary of Proposed Treatment of Solid Waste in the Revised SEEA

33. It is proposed to use the CPC, with additions, as the framework for tracking all physical flows. It will be integrated with additional categories (such as those outlined in Annex 1) to fill in the gaps for flows from the environment to the economy and from the economy to the environment. EWC Stat should be used for classifying solid waste, since CPC is not well-suited for this purpose. It is proposed to align the definition of products and by-products with CPC, with the addition of EWC Stat categories as necessary.

34. It is suggested to structure the classification of physical flows as follows:

- Flows from the environment to the economy or “inflows” should be classified by CPC, complemented by additional flows from the environment not covered by CPC, using a classification scheme such as the one shown in Annex 3.

- Flows within the economy should be classified according to CPC in the case of products or by EWC Stat in the case of solid waste.
- Flows from the economy to the environment or “return flows” will then consist of:
 - emissions to air
 - emissions to water
 - solid waste to uncontrolled landfill classified by EWC Stat (if possible)
 - dissipative use
 - dissipative losses
 - return flows of water (excluding the emissions)
 - additional items
- While some of these return flows cannot be directly observed, tracking of physical flows within the economy and application of the principle of material balance may allow them to be inferred.

E. Questions to the Expert Group

- (1) Do you agree with the proposed classification of flows from the environment to the economy (inflows-Annex 3), flows within the economy (products and solid waste – CPC and EWC Stat), and flows from the economy to the environment (outflows – Annex 3 and EWC Stat)?*
- (2) Do you agree with the proposed definitions of waste, products, and residuals?*
- (3) Do you agree that EWC Stat should be used to classify solid waste?*
- (4) Do you agree with the conclusion that it is useful to concord CPC with the EWC to classify all physical flows within the economy (complemented as necessary by additional categories)?*
- (5) Are there additional existing classifications that are relevant to the classification of physical flows and wastes? How does the proposed classification compare to national classification schemes? How does the proposed classification compare to classifications for other wastes (e.g., gaseous wastes), if any?*

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 Eutrophication 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 there from
 - 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 proposal³

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.0.1.3	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 inulin 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 ⁴
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

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

⁴ 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	Uranium 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-ferrous 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	Gypsum; 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 (CO₂)
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 (N₂O)
A.3.1	Dinitrogen oxide (N ₂ O) other than from dissipative use as a product
A.3.2	Dinitrogen oxide (N ₂ O) from dissipative use as a product
A.4	Nitrous oxides (NO_x)
A.5	Hydroflourcarbons (HFCs)
A.6	Perflouorocarbons (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 (SO₂)
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 compounds (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: 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, debarked 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.

CPC Ver. 2 subclasses linked to EWC-Stat	
subclass code	Subclass name
34654	Excreta of animals useful for manure/fertilizer and fuel preparation
35110	Paints and varnishes and related products
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

CPC Ver. 2 subclasses linked to EWC-Stat	
subclass code	Subclass name
	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
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 5: Complete list of EWC-Stat subclasses

EWC Stat Code	EWC Stat Title
01	compound wastes
01.1	Spent solvents
01.2	Acid, alkaline or saline wastes
01.3	Used oils
01.4	Spent chemical catalysts
02	Chemical preparation wastes
02.1	Off-specification chemical wastes
02.2	Unused explosives
02.3	Mixed chemical wastes
03	Other chemical wastes
03.1	Chemical deposits and residues
03.2	Industrial effluent sludges
04	Radioactive wastes
04.1	Nuclear waste
04.2	Spent ionizing sources
04.3	Equipment and products contaminated by radioactivity
04.4	Soils contaminated by radioactivity
05	Health care and biological wastes
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
06.2	Non-ferrous metal waste and scrap
06.3	Mixed metal wastes
07	Non-metallic wastes
07.1	Glass wastes
07.2	Paper and cardboard wastes
07.3	Rubber wastes
07.4	Plastic wastes
07.5	Wood wastes
07.6	Textile wastes
07.7	Waste containing PCBs
08	Discarded equipment
08.1	Discarded vehicles
08.2	Discarded electrical and electronic equipment
08.3	Bulky household equipment
08.4	Discarded machines and equipment components
09	Animal and vegetal wastes
09.1	Waste of food preparation and products
09.2	Green wastes

EWC Stat Code	EWC Stat Title
09.3	Animal feces, urine and manure
10	Mixed ordinary wastes
10.1	Household and similar wastes
10.2	Mixed and undifferentiated materials
10.3	Sorting residues
11	Common sludge
11.1	Waste water treatment sludge
11.2	Sludge from purification of drinking and process water
11.3	Unpolluted dredging spoils
11.4	Cesspit contents
12	Mineral wastes
12.1	Construction and demolition wastes
12.2	Asbestos wastes
12.3	Waste of naturally occurring minerals
12.4	Combustion wastes
12.5	Various mineral wastes
12.6	Contaminated soils and polluted dredging spoils
13	Solidified, stabilized or vitrified waste
13.1	Solidified or stabilized waste
13.2	Vitrified wastes

Annex 6: 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 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	
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 EWStat 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 containing 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 EWCSat 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
0408.19	TRUE			

0408.91	TRUE			consumption". However, can we assume that such things would go under this HS code as well?
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	

		2303.10	TRUE		similar residues	
		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	39320	Ash and residue (except from the manufacture of iron or steel), containing metals or metallic compounds, except precious metals	
		2620.11	TRUE			
		2620.19	TRUE			
		2620.29	TRUE			
		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 stabilised sludge is supposed to be in here rather than under 11.
13.2	Vitrified wastes	-				