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Integrated framework for environmental activity accounts

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***Abstract**: The environmental activity accounts (environmental protection expenditure accounts, resource management expenditure accounts, environmental goods and services sector accounts, environmental taxes, environmental subsidies and other transfers) have been developed at different points in time, some of them going more than 20 years back whereas others are still in their infancy. In European, the legal basis to produce and collect those accounts has followed a modular approach. Circumstances made the different accounts to drift apart. As a consequence, some concepts, definitions, valuations and classification groupings are not identical across modules. For instance, definitions and valuation of adapted goods are not the same, groupings of classifications are not the same, valuation of exports differ, etc.*

This situation is unsatisfactory. Correspondingly, an integrated framework for the monetary environmental accounts is in the SEEA CF research agenda.

Much work has been done in Europe about it since 2013. Work has advanced in several threads. A first area of work is a clarification of concepts and definitions e.g. main purpose criterion; specific, cleaner and resource efficient products; characteristic and non-characteristic activities, etc. This terminology is used in the new Eurostat EGSS and EPEA handbooks published in late 2016 and early 2017. A second area of work is about streamlining the activity accounts with the double purpose of achieving efficiencies in the compilation systems, and of providing a more coherent global picture.

This paper will review the terminology in the new Eurostat EGSS and EPEA handbooks and will discuss scenarios for streamlining the activity accounts.

1. Problem statement

The environmental activity accounts, also known as monetary environmental accounts, record transactions in monetary terms between economy units that may be considered environmental. There is not one single SEEA environmental economic account but many, and they address the issue from a specific angle or with a specific focus. SEEA CF chapter IV is devoted to environmental activity accounts but it does not provide a list of existing or possible environmental economic accounts. SEEA section 4.2 is mostly devoted to Environmental goods and services sector account (EGSS) and Environmental protection expenditure account (EPEA) with a short reference to Resource management expenditure account (ReMEA); section 4.3 is devoted to other transactions related to the environment, most of which are government payments by or to government. In Europe, where environmental activity accounts have a particularly long history and are rather developed, there are three mandatory data collections, one voluntary data collection and one conceptual framework with no data collection yet. This document considers (the integration of) the following five accounts:

1. Environmental goods and services sector account (EGSS)
2. Environmental protection expenditure account (EPEA)
3. Resource management expenditure account (ReMEA)
4. Environmental subsidies and other transfers account (ESST)
5. Environmental taxes account (ETEA)

Unfortunately, these five accounts are at present not well integrated with each other. Their scope, concepts, definitions, valuation rules and classification groupings are not always identical or consistent across them. Also these ‘accounts’ are not always well embedded in an accounting structure. This is also acknowledged in chapter IV of the SEEA CF: discrepancies

between EGSS and EPEA are mentioned and discussed in paragraphs 4.6, 4.32, 4.33, 4.42, 4.101 and the whole section 4.3.4. Annex 1 lists the main differences between EGSS and EPEA in the EU data collections.

It is not only that these five accounts have different accounting structures or that they measure different transactions and with different level of detail. Those differences may be justified for reasons of specialisation, focus or complementarity. The main issue is that their estimates are different and cannot be reconciled, or they can only be reconciled with an extraordinary, impractical effort. It also means that each account requires a separate compilation process and it is not straightforward to set up a unified compilation system. This creates a big entry cost for compilers of those accounts. It also creates a steep learning curve for users and producers alike.

How did we come to this situation? Mostly historical legacy and circumstances made the accounts to drift apart. The five economic environmental accounts were developed at different points in time, some of them going more than 20 years back whereas others are still in their infancy. EPEA, the first account (embedded in the SERIEE methodology 1994), was developed with a very high level of ambition, seeking conceptual soundness and comprehensiveness rather than practical implementation. Because it was the first account, and also because of its ambition, EPEA covered not only *the expenditure in EP* but also a simplified account of *the supply of EP services*. When a proper account of the supply side was developed five years later (environmental goods and services industry manual, 1999), it was not part of the same conceptual framework as EPEA. This account would be later aligned to SEEA CF and become the EGSS. A manual on environmental taxes was issued in 2001 (revised in 2013) and a manual on environmental subsidies in 2015. In addition, there is an unpublished Eurostat manual on ReMEA dating from 2013. ReMEA, which is arguably the twin sister of EPEA, lags roughly 20 years in development because environmental protection was historically more relevant than resource management (not fully true anymore[1]) and because of scarcity of data sources. During the development of EGSS, ETEA and ReMEA since 1999, five additional handbooks and guidelines on EPEA were issued (in 2002, 2005, 2007 and 2017), every time seeking further simplification, more practical guidance and closer relation to the data sources (sometimes meaning getting further apart from national accounts). Those adjustments provided hardly stability. Last but not least, the discussions in the European Union around 2010 and 2013 to set up an EU legal basis for ETEA, EGSS and EPEA sought to optimise and simplify each account *individually* (meaning striking the biggest return in terms of data produced with the lowest production costs) made them less integrated *with the other accounts*. For instance, different groupings of the classification of environmental activities (CEA, i.e. CEPA plus CReMA) exist for EGSS and EPEA and

[1] According to Eurostat's estimates, environmental protection activities in the European Union increased from a gross value added of 102 billion euros in 2000 to 165 billion euros in 2014 (or 62% increase), whereas resource management increased from 33 billion euro to 124 billion euro over the same period (or 375% increase). This is largely due to an increase of energy production from renewable sources (for example, wind, solar power and biofuels) and products for energy and heat saving. Source: this article based on EGSS

consequently the results cannot be compared unless countries endeavour to produce estimates with more detail than required.[2]

This situation is not satisfactory. The need to integrate environmental activity accounts is recognised in the SEEA CF research agenda. It has been discussed in the Eurostat working group and task forces since 2013. Statistics Netherlands presented a paper in the 2016 meeting of the London Group. An integrated framework would exploit the full benefits of a single conceptual framework, simplify data production, make it more efficient and improve quality of estimates. Users would get results simpler and easier to understand.

2. Proposed way forward for an integrated framework for activity accounts

Two lessons emerge from the historical path described in the previous section:

1. A modular approach is better than a monolithic approach. The environmental activity accounts cover a very broad subject. Taken as an ensemble they cover a very wide range and there is a risk to be overambitious. The original SERIEE 1994 methodology aimed to provide all the answers that existed at that time (especially about environmental protection - EPEA) but turned to be too demanding to produce and comprehend.[3] Over the years that EPEA methodology was gradually simplified and slimmed down whereas other accounts that were just mentioned as e.g. 'intermediate systems' in the original SERIEE 1994, covering specific, complementary topics, flourished: EGSS, ETEA, ESST. The experience in Europe setting up environmental accounts in 'modules' was good. There is one module for each environmental activity account (ETEA, EGSS, EPEA).[4]
2. The modules must fit with each other. One risk of developing modules over a long period of time is missing view of ensemble. The situation described in the previous section shows that differences in scope across modules as well as similar but not identical variables create double work, confuse users and make harder efficiency gains and economies of scale. This means that they must use the same concepts (and terminology, see Annex 2), definitions, classifications and valuation rules (or, at least, allow a neat reconciliation). The modules are to fit as part of a common conceptual framework (see Annex 3). In addition, it must be clear how the modules relate to each other and to the SNA. SEEA CF and SNA provide the basis for this.

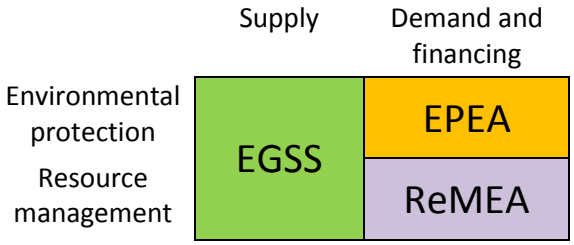
Therefore, this paper proposes a framework for environmental activity accounts structured in modules and in such a way that they fit neatly with each other. In other words, it suggests an integrated framework.

[2] At the time the SEEA CF was written (2010-2011) the community of environmental accountants was in the middle of this process.

[3] SERIEE 1994 had in fact the ambition of being a system for the collection of economic information for the environment and that, at that point in time, it described the ambitious approach for EPEA and acknowledged the future development of 'intermediate systems' such as e.g. 'eco-industries' which later became the EGSS.

[4] Those modules are mandatory data collections which take the form of Annexes of an EU Regulation applicable to EU Member States. This paper does not use the term 'module' in the sense of mandatory data collection or legal act, but in the sense of one environmental activity account which can be produced independently from others but which fits as part of a big ensemble.

We propose a framework with three core accounts, or core modules: EGSS, EPEA and ReMEA. EGSS accounts focuses on the supply of environmental products, EPEA focuses on demand and financing of environmental protection and ReMEA focuses on the demand and financing of resource management.



These three core accounts are independent but they fit tightly together. Independent accounts means that countries can produce only one, or two or three. They are not required to calculate them all but there are economies of scale in doing so. Accounts fitting tightly together means that they contribution to a single conceptual framework, variables and aggregates produced for one account can be re-used in another account with no adjustments or with a few, well-defined adjustments e.g. for valuation. The three core accounts become specialised and complementary. A proposal on how these three modules can work together as a core is further developed below.

Next there is the module on environmental subsidies and other transfers (ESST). It covers a specific issue but deeper than the core accounts. ESST provides more breakdowns and more variables regarding this issue. ESST is to be hierarchically fully consistent with the 3 core accounts.

Finally, there is the module on environmental taxes. This is a specialised, less integrated module than the other four. This is because this module uses a definition of environmental tax different than the core modules. This is further developed in section 2.5.

In a modular structure, it is essential to have unified terminology for all the modules. It must be avoided that the same concept or term has different meanings in two modules, or conversely that two names exist for the same concept. Annex 2 presents the unified terminology used in the latest Eurostat handbooks for EPEA and EGSS.

The focus on achieving an integrated framework is thus on the modular approach. However, from a conceptual point of view it is necessary to show how these modules fit into one accounting framework that is directly based on the SNA. Accordingly, this makes it clear to compilers and users of the data how the modules relate to each other. This accounting framework is not a compilation or reporting table or set of tables, although some more advanced countries may try to do this. The accounting framework is ‘complex’ and data demanding, and for implantation of the accounts countries should focus on the different modules. The purpose of introducing it here is thus purely from a conceptual point of view. Possible tables for this accounting framework are presented in Annex 3.

The rest of this section 2 provides more details about each environmental activity account.

2.1 Environmental goods and services sector account (EGSS)

Data from the EGSS focuses on the supply of environmental goods and services.[5] This note proposes that this core module covers all relevant output and production-related variables needed for environmental activity accounts (meaning also for the other modules). This would mean an extension compared to the present EGSS in the EU.

Coverage of environmental activities: all environmental activities as defined in the SEEA CF (environmental protection and resource management [6]). These activities can be performed as principal, secondary or ancillary activity of units in the sector. It must be clear that the sector of environmental goods and services encompasses all units producing environmental goods and services. Otherwise said, the EGS sector does not only encompass units whose main activity is the production of environmental products.

Coverage of environmental products: all environmental products (including goods and services), namely specific services, adapted goods, connected goods, etc. In the integrated framework, 'environmental goods and services' is the same as 'environmental products'.

Variables: output, gross value added, employment and exports. Those four variables are already part of European EGSS (EU legal base). In addition, countries which choose to compile EGSS alongside the other two core modules can estimate as part of EGSS the following variables related to the production of environmental products[7]: intermediate consumption (for the production of environmental products), compensation employees (idem), GFCF (idem), imports (of environmental products), consumption of fixed capital, net operating surplus. Some of those variables are necessary for (and so far collected in) EPEA, but it is more efficient to collect all production-related variables together. For instance, intermediate consumption (for the production of environmental products) is the difference between output and gross value added already collected in EGSS; compensation of employees can be calculated as a by-product of employment and gross value added, already collected in the EGSS; imports and exports (of environmental products) could be compiled together, etc.

Valuation rules: basic prices (output, gross value added, exports), purchaser's prices (intermediate consumption, GFCF, imports), full-time equivalents (employment). Adapted goods are measured at full costs.

Main breakdowns and classifications: By ISIC/NACE of the producer and by CEPA&CReMA of the function. It is also possible to have breakdowns by type of environmental products (specific, cleaner, resource efficient) and/or by type of output (market, non-market, ancillary output, output for own final use).

Additional notes/explanations:

EGSS provides the information for a production account for environmental products. It also provides the information for a supply table and parts of a use table of environmental products (see Annex 3).

[5] SEEA CF paragraph 4.41
[6] SEEA CF paragraphs 4.12 and 4.13
[7] As stated in the previous section, countries are not obliged to compile the three core accounts. Countries which do not compile EGSS but compile EPEA/ReMEA can compile the listed variables as part of the latter modules

As compared to EPEA, EGSS has a focus on product breakdowns, types of output (market, non-market, etc.), analysis of production and NACE breakdowns of producer units. Instead there are no breakdowns by institutional sector. Those breakdowns are not needed for a supply table, but they are needed for a production account. It may be possible to add institutional sector breakdowns with a rough mapping[8] which would also help to complete the link between EGSS and EPEA.

EGSS, and to a lower extent EPEA, are closely related to the Clean Technology Satellite Account under development in Canada.

2.2 Environmental protection expenditure account (EPEA)

EPEA focuses on the expenditure in environmental protection and its financing by the national economy and the institutional sectors. This consists mostly of current and capital expenditure, and transfers (in particular with the rest of the world). Historically, EPEA also collected some supply side variables (output) but only related to a subset of products, namely specific environmental protection services. This data are also collected in EGSS. To avoid duplicities, it is proposed that output variables are collected only in EGSS.

Coverage of environmental activities: environmental protection activities

Coverage of environmental products: all environmental protection products (including goods and services), namely: specific services, adapted goods, connected goods, etc. Note this means more covering than only environmental protection services, as in the EU legislation.

Variables: final consumption (of environmental products), intermediate consumption (of environmental products), GFCF (of environmental products), taxes and subsidies on production (of environmental products), transfers (between institutional sectors and with the rest of the world). Countries which choose to compile EGSS alongside EPEA can estimate as part of EGSS the following variables related to the production of environmental products[9]: intermediate consumption for the production of environmental products, employment (for the production of environmental products), consumption of fixed capital (of producers of environmental products), net operating surplus (of producers of environmental products).

Valuation rules: purchaser's prices (final consumption, intermediate consumption, gross capital formation, exports). A double valuation of cleaner products (adapted goods) would be needed: at extra costs and at full costs (purchaser’s prices). This is to use consistently these estimates for EPEA and EGSS. This double valuation is a new feature.

Main breakdowns and classifications: Flows by institutional sector incurring in expenditure and by CEPA of the function. It is also possible to have breakdowns by type of environmental product.

Notes/explanations:

[8] Allocation of output and other variables to sectors can start from mapping market output to corporations, non-market output to government & NPISH and output for own final use to households, as a starting point.
[9] Countries which do not compile EGSS can compile those variables as part of EPEA.

EPEA provides most of the elements for an expenditure account on environmental protection products. It also provides most of the elements for a use table of environmental protection products. In addition, it provides the main information about transfers on environmental products with the rest of the world and between the institutional sectors in the economy (supplementary information in the module ESST, see below). The main aggregate provided by EPEA is the national expenditure on environmental protection.

EPEA is concerned both on the gross capital formation by producers of environmental products (i.e. the capital purchases of the environmental producers) and the gross capital formation of environmental products (i.e. environmental products which are capital products; they are output of the environmental producers). These are separately identified.

If EPEA does not collect supply side variables, it can focus only on expenditure (final consumption, intermediate consumption, gross fixed capital formation) and transfers. It can be simpler and more focused. Whereas EGSS collects exports and EPEA collects imports, it is normally simpler and provides better quality to estimate exports and imports together. In practice they may all be estimated in EGSS or in EPEA. Eurostat has proposed tests to EU countries to assess which is the best option.[10]

EPEA, at least the simplified version currently in the EU, does not collect systematically all the environmental transfers across institutional sectors. Instead it focuses on transfers between the national economy and the rest of the world (as they are necessary to calculate the national expenditure on EP) and the transfers between the government sector and the other sectors in the country, as those are the biggest in size and easiest to estimate from available data sources. Transfers between sectors not involving the government are secondary. A systematic collection of all environmental transfers between the institutional sectors of the economy would be left out of EPEA and it would remain for the ESST module.

2.3 Resource management expenditure account (ReMEA)

All the explanations in the previous section about EPEA are equally valid for ReMEA, with the only difference that ReMEA addresses resource management rather than environmental protection. Correspondingly it uses the CReMA classification instead of CEPA. Source data are scarcer.

Conceptually it would be possible to merge EPEA and ReMEA into one single account encompassing both environmental protection and resource management. For compilation purposes there may be arguments to keep modules separate. This is proposed here.

The proposed framework has identical architecture for ReMEA as for EPEA e.g. same variables, but some details can be simplified if scarcity of data sources does not allow compilation. Integration with EGSS would also be identical. In this regard the EGSS may be used as an important data source that can (partly) overcome the shortage of data sources for ReMEA.

[10] 2017 meeting of the Eurostat working group monetary environmental statistics and accounts, document 03

The expenditure side would therefore consist of two twin parts with different level of ambition, one for EPEA (more detailed) and one for ReMEA (less detailed) but sharing common specifications as to hook with EGSS and the environmental subsidies module.

2.4 Environmental subsidies and other transfers account (ESST)

Data from the ESST in combination with EPEA could be used to calculate the financing of EP or RM.

As compared to the three core accounts, the module on environmental subsidies and other transfers (ESST) is a specialised module supplementing the others. ESST covers a few environmental transactions already captured in the core modules, namely environmental subsidies and transfers, but providing more details. In addition, ESST covers other flows out of the scope of the core modules e.g. tax abatements.

Coverage of environmental activities: all environmental activities (environmental protection and resource management).

Coverage of environmental products: all environmental products (including goods and services), namely specific services, adapted goods, connected goods, etc. Same approach to environmental purpose as the core accounts.

Variables: subsidies on environmental products, subsidies on environmental production, other transfers, other transactions outside the scope of the core modules (e.g. tax abatements, PEDS, etc.). They can be distinguished as follows:

- Subsidies on products (defined as D.31 in SNA, and applied in ESST to environmental products): analytical value because those subsidies alter the prices to consumers of environmental products; its compilation is relevant as they allow to balance EGSS estimates at basic prices and EPEA estimates at purchaser's prices.
- Subsidies on production (defined as D.39 in SNA and applied to environmental products): they are related to other variables about production by environmental producers collected in EGSS and EPEA such as employment, compensation of employees, operating surplus, consumption of fixed capital, etc.
- Other transfers within the scope of SNA (defined as D6, D7, D9 in SNA and applied to environmental products): They can be current transfers or capital transfers. Whereas these flows are partially covered in EPEA, ESST provides a more thorough and comprehensive framework (transfers across all institutional sectors).
- Other transactions outside the scope of SNA and other core modules, e.g. potentially environmental damaging subsidies (PEDS, see SEEA CF 4.147), tax abatements and other type of support measures (price support, regulatory support mechanisms, etc.)[11]

(The first three bullet points above can be mapped to the terminology used in SEEA CF 4.138 and Table 4.8: social benefits, investment grants, rents, donations, other transfers, etc.)

[11] Eurostat Environmental subsidies and similar transfers guidelines, 2015 edition

Main breakdowns and classifications: By ISIC/NACE of the producer (only for subsidies on products and production), by CEPA&CReMA of the function and by institutional sector. These three combined breakdowns are a main strength of ESST because each core account uses only two breakdowns. In addition, it is possible to have breakdowns by type of environmental products and by types of output (market, non-market, etc.)

Additional notes/explanations:

Countries producing ESST in addition to the three core accounts can reuse the ESST estimates of subsidies on products to balance EGSS estimates at basic prices and EPEA estimates at purchaser's prices, with high level of detail. Ideally this would be done by product (e.g. at level of three groupings: specific product, clearer product and resource efficient product), ISIC/NACE and CEA function.

2.5 Environmental taxes account (ETEA)

The module on environmental taxes accounts (ETEA) is a specialised module covering a topic not addressed in the core modules. ETEA covers environmental taxes, defined as taxes on 'something that has a proven, specific negative impact on the environment'[12], i.e. environmental harmful products. It is noted that these environmental taxes are different from the taxes on environmental products, as defined above. The latter are taxes on products (SNA definition) on EP and RM products, i.e. environmental purpose products. Therefore the scope of ETEA is different from the other modules. ETEA is rather a standalone module sharing some technical elements such as national accounts concepts, same classifications, etc.

Coverage of activities: all production activities in the economy, as well as taxes on income and capital taxes.

Coverage of products: products that have a proven, specific negative impact on the environment. Different approach to (non)environmental purpose than the core accounts and ESST.

Variables: taxes as defined in the SNA:

taxes on production and imports (SNA D.2)

current taxes on income, wealth, etc. (D.5)

capital taxes (D.91)

Main breakdowns and classifications: By ISIC/NACE of the taxed unit and by type of tax (energy, transport, pollution, resource).[13] Conceptually it is also possible by CEA function but very demanding in practice.

Additional notes/explanations:

There is a link between ETEA and EPEA with regard to the so called earmarked taxes which describes the transfers to calculate the financing of the environmental protection expenditure.

[12] SEEA CF para 4.150 and also Eurostat Environmental taxes statistical guide, 2013 edition, page 9
[13] SEEA CF para 4.155

It is worthwhile to identify in the environmental taxes module these so called earmarked taxes and make them consistent with the taxes that are reported in the EPEA.

3. Questions for the London Group

- **Do you agree with a framework for environmental activity accounts based on a modular approach?**
- **Do you agree with a core of 3 modules: EGSS, EPEA, ReMEA?**
- **Do you agree with ESST being a specialised module supplementing the core modules? Do you agree with ETEA being a specialised module covering a topic not addressed in the core modules?**
- **Do you agree that from a conceptual point of view to introduce an overall accounting framework (which are NOT reporting tables for data collections) to be introduced in a future revision of the SEEA CF?**
- **Do you have comments to the technical details in section 2 for each of the modules (coverage of activities, coverage of products, variables, valuation rules, breakdowns & classifications, etc.)?**

Annex 1: Compared main features of EGSS and EPEA in the EU data collections

The following table compares the main features of EGSS and EPEA in the EU data collections.[14]

	EGSS	EPEA
Scope activities		
- Conceptual	SEEA-CF: Environmental protection and resource management	SEEA-CF: Environmental protection only
- Operational	Indicative compendium, operational lists (using NACE, CEPA, CReMA)	All activities listed in CEPA
- Categories	Characteristic and non-characteristic activities	Only characteristic activities
- Types	Primary, secondary, ancillary	Primary, secondary, ancillary
Scope products		
- Conceptual	All EP and RM products	EP products (mostly only EP services)
- Operational	Indicative compendium, operational lists (using CN, CEPA, CReMA)	All products listed in CEPA
- Categories	Specific, cleaner and resource efficient products	Mostly (specific) EP services
Characteristics collected	Output, GVA, exports, employment	Output, employment, costs of production: GFCF and net acquisition of non-produced assets for EP
		Imports and exports of EP services; net taxes on EP services
	-	Final consumption of EP products
		Intermediate consumption of EP services by specialist producers
	-	EP transfers
Valuation	Basic prices (market output, own final use and exports)	Basic prices (market output, own final use and exports)
	Sum of costs of production (non market and ancillary output)	Sum of costs of production (non market and ancillary output)
		Purchaser's price (final consumption, GFCF and exports)
		Extra costs (cleaner products)
Classifications	NACE; CReMA and CEPA	Institutional sectors, NACE (for ancillary producers); CEPA
Mandatory breakdowns	NACE (A*21), CEPA (7 groupings); CReMA (8 groupings)	NACE (only ancillary producers in corporations 23 groupings); CEPA (different groupings by institutional sector)
Voluntary breakdowns	NACE (39 groupings), all CEPA and CReMA classes	NACE (23 groupings); all CEPA classes
Categories of environmental products / output		
Mandatory	Market environmental products / output	(Specific) EP services: market inc. for own final use, non market, ancillary
Voluntary	Market specific products / output	Household final consumption on EP products different from EP services (adapted and connected products)
	Market cleaner and resource efficient products / output	GFCF on EP fixed assets (end of pipe investments; investments in integrated technologies) (by ancillary EP producers)
	Non-market output	
	Ancillary output	
	Output for own final use	

The main common features of EGSS and EPEA are as follows:

- Both EGSS and EPEA are based on SEEA-CF
- They use the same definitions for output, employment and exports
- They measure the same types of production (primary, secondary, ancillary) and of output (market, non-market, own final use) (although in the EU the EGSS mandatory collection is only about market output)
- They use the same valuation rules and the same classifications (exception: cleaner

[14] Source: Eurostat EPEA handbook edition 2017, section 4.3.1

products are valued at extra costs in EPEA and at basic prices in EGSS).

The main differences are:

- EGSS accounts cover environmental protection and resource management. Instead EPEA is focused on environmental protection only; the counterpart of EGSS resource management part would be in this case ReMEA.
- As regards production activities, EGSS covers characteristic and non-characteristic activities. Instead EPEA only covers characteristic activities.
- As regards products, EGSS covers environmental specific products and cleaner and resource efficient products. In the mandatory part of EGSS they are reported together, and they are distinguished on a voluntary basis. The mandatory part of EPEA only covers specific EP services. EPEA covers specific EP goods (=connected goods) and cleaner EP goods (=adapted goods) in the voluntary part and only for some use transactions (final consumption by households).
- EGSS does not have breakdowns by institutional sector. This breakdown instead is necessary in EPEA. EGSS does not distinguish either between specialist and non-specialist units in the corporation sector.
- EGSS records output of cleaner products at full value (at basic prices), whereas EPEA only records the extra cost of these products in relation to normal products (on a voluntary basis, limited to households' final consumption).
- Because of the peculiarities of the EU reporting frameworks, the mandatory CEPA breakdowns in EGSS are not identical to the mandatory CEPA breakdowns in EPEA. However both EGSS and EPEA collect voluntarily data by CEPA class breakdowns.
- The scope of EGSS is operationalised on an indicative compendium and operational lists of environmental products. The scope of EPEA is operationalised based on CEPA.
- Gross fixed capital formation for the production of EP services is not reported as such in EGSS. However a part of it is implicitly part of the EGSS output. Whereas in EPEA the GFCF for the production of EP services includes all products whether environmental or not (cars, computers...), EGSS only collects data relating to capital goods and services that are environmental products. It means that in general there will be no direct link between EGSS and EPEA in this respect. Furthermore GFCF for the production of EP services may consist of imported capital products, a flow which is not described in EGSS.

Annex 2: Terminology

This annex presents the terminology in the new Eurostat EGSS and EPEA handbooks aiming to unify terms for all the environmental activity modules.

1. Environmental activities

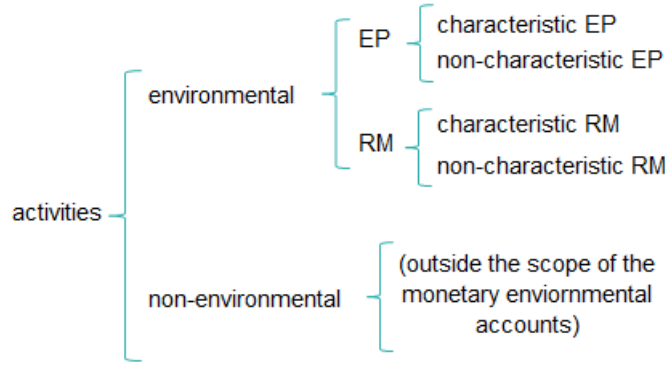
SEEA-CF (§ 4.11) states that environmental activities encompass two types of activities, namely whose primary purpose is to:

- reduce or eliminate pressures on the environment. These are called **environmental protection activities**
- make more efficient use of natural resources. These are called **resource management activities**

Environmental protection activities are defined according to SEEA-CF (§ 4.12) as all activities and actions which have as their main purpose the prevention, reduction and elimination of pollution and of any other degradation of the environment. Those activities and actions include all measures taken in order to restore the environment after it has been degraded. **Resource management activities** are defined (SEEA-CF § 4.13) as all activities and actions which have as their main purpose preserving and maintain the stock of natural resources and hence safeguarding against depletion. Activities that are neither EP nor RM are **non-environmental activities**. These are outside the scope of environmental activity accounts. They are, for instance, activities which while beneficial to the environment primarily satisfy the technical needs or the internal requirements for hygiene or safety and security of an enterprise or other institution.

Characteristic environmental activities are the environmental activities that directly serve an environmental protection or resource management purpose as defined in SEEA-CF and Regulation (EU) No 691/2011. Activities which do not directly serve an environmental purpose but which produce specifically designed products whose use services an environmental purpose are called **non-characteristic environmental activities**.

Categories of activities



The definition of environmental activities emphasises the purpose of the activities and actions. While some economic activities may be undertaken only for a single purpose, many activities are undertaken for a variety of purposes. In those cases, the primary purpose must be identified. The Eurostat handbooks provide guidance in this respect.

2. Environmental products

Products play a very important role in activity accounts because the production and

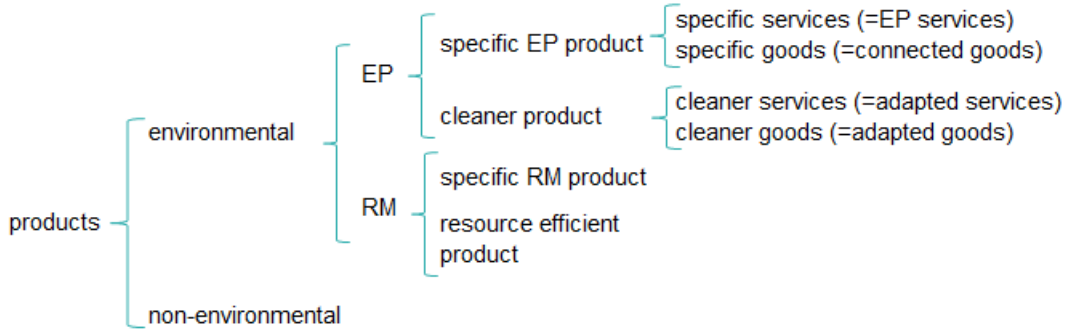
expenditure on environmental protection and resource management is mostly about production of and expenditure on *products*.

Environmental products are produced, designed and manufactured for purposes of environmental protection and resource management. Other products are non-environmental. There is a distinction between environmental products for environmental protection and for resource management.

Environmental protection products can be categorised by whether they have a primary or secondary environmental protection purpose. Products whose primary purpose is environmental protection are called **specific EP products**.[15] Non-specific products may serve a secondary environmental protection purpose because they are specifically designed to be more environmentally friendly than normal products of equivalent use. They are called **cleaner EP products**. As cleaner products do not serve a primary environmental protection purpose, EPEA (i.e. the current European EPEA) does not account the expenditure on these products at their full value; only the 'environmental protection share' should be accounted for, which can be measured by the extra cost of the cleaner product compared to an equivalent normal product. This principle is known as extra costs valuation.

Environmental products may be goods or services. In the case of environmental protection, specific *services* will also be called **environmental protection services**. Experience shows that in most countries the EP services constitute the bulk of the environmental protection products. Instead, specific EP *goods* correspond to the concept of connected goods in SEEA-CF and other manuals. Cleaner EP products correspond to the concept of adapted goods in SEEA-CF and other manuals. Adapted services in principle may exist but de facto are rare.

Categories of products

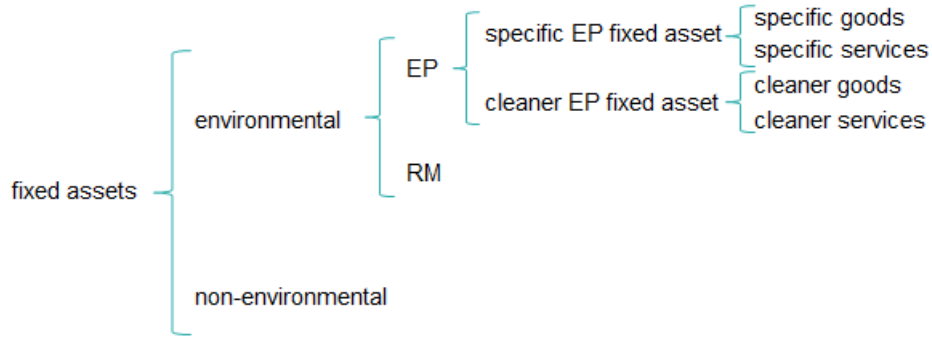


Resource management products can be classified similarly to done for EP products, into **specific RM products** and **resource efficient RM products**, depending on whether they have a primary or secondary RM purpose.

A similar terminology is needed for fixed assets, with a view to account for capital expenditure in EPEA and ReMEA. Fixed assets may either be goods (equipment and plant) or services (R&D, technical services). Fixed assets can be environmental-related or non-environmental-related. The former are sub-classified into assets for environmental protection and assets for resource management. Assets for environmental protection may have a primary EP purpose or a secondary EP purpose. They will be called **specific EP fixed assets** and **cleaner EP fixed assets**, respectively.

([15]) For a sake of clarity the term 'characteristic products' is not used and reserved it for characteristic activities, as explained above

Categories of fixed assets



A similar terminology can be created for fixed assets for resource management.

This classification of fixed assets is more relevant for some producers than for others. In the case of specialist producers (see definition below), it is assumed that all their fixed assets are used for environmental activities. For them there is no need to distinguish between specific (=primary environmental purpose) and cleaner fixed assets (=secondary environmental purpose). Instead this typology of assets makes more sense when the principal activity of the producer is not an environmental activity. In that case, assets with primary environmental purpose correspond to the concept 'end-of pipe technologies' from SEEA-CF and other manuals. Correspondingly, assets with secondary environmental purpose correspond to 'integrated technologies'.

3. Environmental producers; specialist producers

Environmental activity accounts study the *production* of environmental products as well as the *consumption*, *investment* and *financing* of those products and other economic functions. Two types of statistical units are involved in those transactions, one of them specific for production activities.

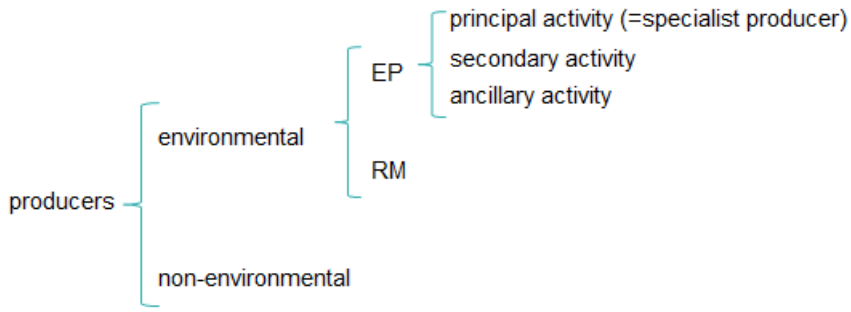
For purposes of studying economic behaviour in general, the central statistical unit in national accounts and in environmental activity accounts is the **institutional unit**, which is defined as "an economic entity characterised by decision-making autonomy" (ESA 2010, §§ 1.57, 2.12). Institutional units are not considered isolated but in groups of units with a similar type of economic behaviour. They are called **institutional sectors** (ESA 2010 § 2.31).

For purposes of analysing production, institutional units are divided/decomposed into smaller units which are more homogenous with regards to the various production activities and location. These more homogenous units are called **establishments** in SNA 2008 and **local kind-of-activity** units in ESA 2010 (they are basically the same concept, and the term 'establishment' will be used hereby). Establishments do not necessarily have decision-making autonomy as they may be part of a larger institutional unit who has the decision-making.

Establishments can engage in the production of environmental products as part of their principal, secondary or ancillary activity (the principal activity of an establishment is the activity for which the value added exceeds that of any other activity carried out within the same unit, ESA 2010, § 3.10). **Specialist environmental producers** are establishments whose primary activity is the production of environmental products. **Secondary environmental producers** are establishments which produce environmental products as secondary activity. **Ancillary environmental producers** are establishments which produce

environmental products as ancillary activity, otherwise said they do not sell their environmental production to other economic units but consume the outputs themselves. Ancillary producers could potentially include households too.

Categories of producers



Secondary environmental producers are expected to be less important for environmental activity accounts than specialist or ancillary producers, and compiling figures for them is more labour-intensive than for the others. For this reason secondary producers are frequently grouped together with one of the other two categories. This grouping must be done in the same way in all environmental modules; otherwise calculations and results cannot be interchanged across modules.

In principle, the classification of producers in specialist, secondary and ancillary producers is independent and transversal from the classification of producers in institutional sectors. This means that, in theory, specialist producers can be found in any institutional sector. However in practice the term 'specialist producer' is reserved for the specialist producers in the corporation sector (as opposed in particular to the government sector). This is both for conceptual and practical reasons.[16]

([16]) The functions of government units differ across countries e.g. in some countries government contracts out the production of specific EP products to the private sector, whereas in other countries government sets up production units for this purpose. In the former case, all the units in the government sector engaged in production of EP services can be assumed to be specialist producers. Secondly, there are also differences across countries in the recording in the data sources for EPEA e.g. whether the underlying statistical unit in COFOG data is the institutional unit or the local KAU. This matters for where the secondary activities are recorded

Annex 3: An integrated accounting framework for environmental activity accounts

This annex develops how the modules fit into one accounting framework that is directly based on the SNA.

The integrated set of environmental monetary activity accounts should have the following characteristics:

- A complete functional accounting structure, directly based on the SNA
- Coverage of all environmental economic activities, i.e. environmental production, environmental accumulation and environmental consumption
- Coverage of both environmental protection (CEPA) and resource management (CReMA) activities
- Coverage of all environmental products as defined in SEEA CF
- Inclusion of all relevant environmental transactions and environmental transfers
- Allow derivation of key indicators, including the key indicators for EPEA and EGSS

Below we will describe how the accounts in an integrated framework may look like, namely a) the environmental production account, b) the environmental expenditure account, and c) the supply and use tables for environmental products. It should be noted that this and more work is needed to improve this set of tables. For more details see Schenau (2016).

Environmental production account

The 'environmental production account' presents information on the output of all environmental goods and services (see terminology in Annex 2) by the economy and how much of this output is available for domestic uses. The **top part of the account** is a combined production and generation of income account, that is also presented in SEEA CF (table 4.2). The **bottom part of the account** shows how much environmental output is available for national uses and links directly to the expenditure account. This part of the account uses the supply-use relationship and thus also directly links to the supply and use tables. The two dimensional environmental production account does not allow any specification of CEPA and CReMA categories: the accounts thus have to be complied for each individual CEPA and CReMA category (and their totals).

The **columns show** a breakdown of the environmental production activities, distinguishing characteristic and non-characteristic activities (see Annex 2). For characteristic activities we propose to distinguish between a) Government and b) Corporations. Corporations may be broken down by a) principal and secondary activities (together) and b) own account activities. We thus do not distinguish specialist producers. For non-characteristic activities we propose no further disaggregation, so only 'corporations'. We thus assume that government cannot engage in non-characteristic activities.

The **rows** follow the accounting logic which is directly based on the SNA. The top part of the account describes the intermediate consumption (row 1), value added (row 5) and output of environmental producers in basic prices (row 10). Intermediate consumption is disaggregated into specific environmental products, cleaner and resource efficient products and other products (rows 2-4). Total environmental output at basic prices is also disaggregated into market and non-market output (rows 11 and 12). The bottom part of the account describes how to go from total environmental output in basic prices to environmental output at purchasers' prices available for national uses (row 20) using the supply use relationships. Note

that rows 2 plus 3 is equal to row 14 (Intermediate consumption of environmental products by environmental producers). Finally, in row 21 a correction is made for the extra costs.

Environmental production account

		Characteristic activities			Non characteristic activities	Rest of the world	TOTAL
		Government	Corporations		Corporations		
			Principal and secondary activities	Own account activities			
1	Intermediate consumption [P2]						
2	specific environmental products						
3	cleaner and resource efficient products						
4	other products						
5	Value added						
6	Compensation of employees [D1]						
7	Taxes on production [D29]						
8	Subsidies on production [D39] (-)						
9	Consumption of fixed capital [K1]						
10	Net operating surplus						
11	**TOTAL environmental output (basic prices)**						
12	market output						
13	non market output						
14	Intermediate consumption of environment products (-)						
15	VAT and other taxes on environmental products [D221] (+)						
16	Subsides on environmental products [D221] (-)						
17	Trade and transport margins						
18	imports of environmental goods and services (+)						
19	exports of environmental goods and services (-)						
20	**Total environmental output at purchasers' prices available for national uses**						
21	Extra costs correction (-)						
22	**Total environmental output at purchasers' prices available for national uses: extra costs**						
	Supplmentary items						
23	Employment						

Environmental expenditure accounts

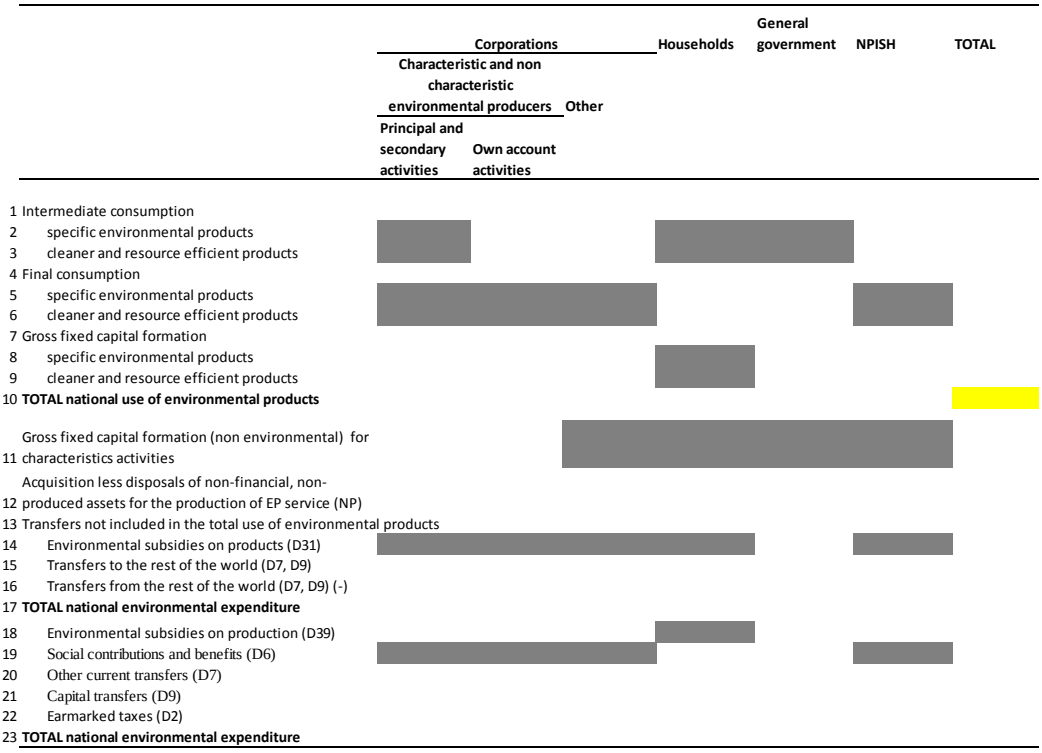
The top part of the environmental expenditure account (rows 1-10) describes the domestic use of environmental products (Figure below). It is directly linked to the production account as total national use of environmental products (row 10) equals total environmental output at purchasers' prices available for national uses: extra costs in the production account (row 22).

In the **columns** a breakdown of the institutional sectors provided, i.e. corporations, government, NPISH, and households. Corporations are broken down by a) characteristic and non-characteristic environmental producers and b) other. Characteristic and non-characteristic environmental producers are broken down into a) principal and secondary activities and own account activities.

In the **rows** intermediate consumption, final consumption and gross fixed capital formation is distinguished. These can each be further disaggregated into specific environmental products and cleaner and resource efficient products.

The bottom part of the expenditure account (rows 11-23) consists of two parts: the first part provides the additional items needed to calculate total national environmental expenditure. The second part allows the calculation of how much each different sector contributes to the financing of the national environmental expenditure.

Environmental expenditure account



Supply and use tables

Supply and use tables for environmental products are two tables with similar structure. The supply table shows how environmental products are produced and imported. The use table shows how these products are used by companies, households and government and exported. The tables follow the format of the 'general' monetary supply and use tables of the SNA. The supply and use tables have detail of 'individual' environmental product categories, which instead the production and expenditure accounts presented above do not have. Instead the supply and use tables do not have detail by institutional unit.

The supply and use tables presented in par. 4.60 and table 4.3 of SEEA CF have a very limited scope, i.e. they cover only environmental specific services related to CEPA. The scope can be extended to include the full scope of environmental products, namely environmental specific products and cleaner and resource efficient products, and both environmental protection (CEPA) and resource management activities (CReMA).

Below we present supply and use tables according to the extended scope. The columns in the use table show:

a) Intermediate consumption of environmental products at NACE level (including a column for total),
b) Final consumption of environmental products by government and households
c) Gross fixed capital of environmental products. This column includes inventory changes
d) Exports of environmental products
e) Total use of environmental products

The rows show the different environmental products. There are many different environmental goods and services, so a classification system has to be applied to provide some order. Different classification systems can be used, for example international classification systems such as CPC. Here we propose to use the following hierarchy to build a classification for environmental products in the supply and use tables, which also follows the recommendations by Eurostat (2015):

a) Specific environmental products or cleaner and resource efficient products
b) Products produced by characteristic or non-characteristic activities
c) CEA classification (CEPA/CReMA)

Supply and use tables for environmental products

SUPPLY	Output at basic prices					Total output basic prices	Taxes less subsides on products		Trade and transport margins	Output at purchasers' prices	Imports	Total supply
	NACE A	NACE B	NACE C	NACE D	NACE ….		environ-mental	non environ-mental				
Specific environmental products												
characteristic activities												
CEPA 1												
CEPA…..												
CreMA 1												
CreMA….												
non characteristic activities												
CEPA 1												
CEPA…..												
CreMA 1												
CreMA….												
Cleaner and resource efficient products												
characteristic activities												
CEPA 1												
CEPA…..												
CreMA 1												
CreMA….												
non characteristic activities												
CEPA 1												
CEPA…..												
CreMA 1												
CreMA….												
TOTAL												

USE	Intermediate consumption					Total intermediate consumption	Final consumption		Gross fixed capital formation	Exports	Total use
	NACE A	NACE B	NACE C	NACE D	NACE….		Government	Households			
Specific environmental products											
characteristic activities											
CEPA 1											
CEPA…..											
CreMA 1											
CreMA….											
non characteristic activities											
CEPA 1											
CEPA…..											
CreMA 1											
CreMA….											
Cleaner and resource efficient products											
characteristic activities											
CEPA 1											
CEPA…..											
CreMA 1											
CreMA….											
non characteristic activities											
CEPA 1											
CEPA…..											
CreMA 1											
CreMA….											
TOTAL											