Statistics Netherlands

Report

Integration of environmental activity accounts

Statistics Netherlands

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Content

Note : This paper is a shortened version of the paper that was written en published in the beginning of 2016 (Statistics Netherlands, 2016). The original version also provides information on how these accounts can actually filled with data (test data for the Netherlands, 2013) and a description of some particular conceptual issues. This project was financed by Eurostat.

1. Introduction

Environmental activity accounts record the transactions in monetary terms between economic units that may be considered environmental (SEEA CF, chapter 4; UN et al, 2012). Generally, these transactions concern activities undertaken to preserve and protect the environment or manage natural resources. Environmental activity accounts follow the general structure and concepts of the SNA, applying an additional classification for environmental activities (CEA).

In 2017 two important modules for monetary environmental accounts, the environmental protection expenditure accounts (EPEA) and the environmental goods and services sector (EGSS), will be implemented in all EU countries as a result of the extension of Regulation 691/2011 on European environmental economic accounts. The module on environmental taxes has already been implemented (2014) and work at Eurostat will continue to further develop modules on ReMEA (resource management expenditure accounts) and environmental transfers. In principle, all these different modules should be part of an integrated system using the same classifications, concepts, terminology and definitions, and using the same data sources. However, in practice this is not the case as there are differences in coverage, concepts and definitions. Accordingly, there is a need for an integrated framework for the monetary environmental accounts (MEA).

During the Eurostat working group meeting on Environmental expenditure accounts in February 2014, Eurostat presented the document 'Further integrating the monetary modules' (Eurostat, 2014). In this document a first proposal was presented to come to an integrated framework for monetary environmental accounts with regard to the definition and classifications of environmental products and the structure for an integrated framework. An update of this document was presented in the working group meeting of 2015 (Eurostat, 2015).

The objective of this paper is to develop an integrated set of monetary environmental activity accounts. We will follow the general principles set out by Eurostat, namely that all modules must be consistent in scope according to common definitions and that all concepts should be defined in a unique way (Eurostat, 2015a). The scope will include both CEPA and CreMA activities and the production, accumulation and consumption of all relevant environmental products. **This paper contributes to the SEEA CF research agenda: the further development of integrated monetary accounts on the European level**.

In section 2 we will discuss the main issue, namely that the different modules for environmental activity accounts now differ with regard to concepts, terminology, scope, accounting structure etc. In section 3 we will present an integrated set of monetary activity accounts following the general guidelines from SEEA CF and the proposals by Eurostat. Section 4 rounds up with some conclusions and recommendations.

2. The issue

2.1 Monetary activity accounts in SEEA CF

Chapter 4 of the SEEA CF describes the environmental transactions that are recorded within the core national accounts framework but that often cannot be easily identified owing to the structure of the accounts or the types of classifications that are used. SEEA CF describes approaches that have been developed for recognizing these transactions and provides appropriate definitions and accounts for organizing information on environmental transactions. Particularly important is the definition and scope of environmental activities and the associated products and producers (section 4.2 in SEEA CF).

Section 4.3 of SEEA CF describes the compilation of the two different modules needed for the analysis of environmental transactions: the environmental protection expenditure account (EPEA) and statistics on the environmental goods and services sector (EGSS). EPEA is a full functional account which closely follows the concepts, definitions and accounting rules of the core national accounts (SEEA CF par. 4.40). However, some degree of deviation from the SNA is required when considering either environmental specificities or the measurement objectives of the EPEA, which are more targeted than the broader macroeconomic focus of the core national accounts. Unlike the EPEA, *statistics* on the EGSS are not compiled in a full accounting format, although the variables that are included are defined and measured in a manner consistent with national accounts principles. Finally, in section 4.4 of SEEA CF a range of environmental transfers are described, including environmental taxes and subsidies, and permits and licences. These transfers are presented as a separate module and not linked to the EPEA or the EGSS.

While both the EPEA and the EGSS are focused on the measurement of environmental activities, they do so from different perspectives (SEEA CF, par. 4.113). Consequently, there are important differences between them. The main differences are summarized in table 4.7 of the SEEA CF, which is reproduced below:

2.1.1 Table 4.7 from SEEA CF: comparison between EPEA and EGSS.

Area of difference	EPEA	EGSS
Accounting structure	Full functional account	Table of production related statistics
Coverage of environmental activities	Environmental protection characteristic activities	Production of goods services used for environmental protection and resource management
Coverage of goods and services	All environmental protection goods and services and expenditure on other goods and services for environmental protection purposes	All environmental protection and resource management goods and services
Coverage of environmental producers	Producers included only in relation to environmental protection specific services	Producers included in relation to all environmental goods and services
Valuation of adapted goods	Net/extra cost only	Full value (at basic prices)
Coverage relating to international trade	Imports included in aggregate measures of expenditure	Exports included in aggregate measures of production
Treatment of taxes and subsidies	Valuation of expenditure at purchasers' prices	Valuation of output at basic prices

We thus conclude that SEEA CF does not provide an integrated framework from which *all* relevant monetary environmental variables and indicators can be derived. Instead, there are several different 'modules' that differ in scope, concepts and accounting structure.

2.2 Eurostat: a simplified accounting framework for EPEA/ReMEA

Eurostat has developed a 'simplified' module on environmental protection expenditure (EPE) for the inclusion into Regulation 691/2011 on European environmental economic accounts. The main reason for developing this simplified module was that the original SERIEE tables (and also the EPEA in SEEA CF, which were derived from SERIEE) were considered too complex. The principle aim of the simplified module for EPE is to calculate the total national expenditures for EP, which in addition can be disaggregated to CEPA classes and different sectors. The EPE module follows a clear accounting logic. First, the environmental output of environmental protection services by different sectors is calculated as the sum of intermediate consumption and value added. Next, using the supply use identity, the total environmental protection output available for national uses can be determined:

> Environmental output + taxes less subsidies + imports – exports =
>
> intermediate consumption + final consumption households + final consumption government *equals*
>
> Total EP output available for national uses

Adding gross fixed capital formation for characteristic environmental activities and correcting for transfers with the rest of the world provides a good approximation of the **total national expenditures for EP**. Finally, adding information on transfers allows the calculation of the financing to the environmental protection expenditure.

The simplified module has also been developed for ReMEA (Eurostat, 2014b). Table 2.2.2 below describes the items necessary for calculating resource management output and expenditure as described in the Eurostat ReMEA handbook[1]. The links with other modules of monetary environmental accounts are also highlighted.

2.2.2 Resource management production and expenditure in the simplified ReMEA accounting framework (Eurostat, 2014b)

	ReMEA	Other monetary environmental modules
	RM output of characteristic producers	EGSS
+	Imports	
–	Exports	EGSS
+	Items for going from producers' to purchasers' price (VAT, other taxes less subsidies on products, trade and transport margins)	
=	RM output at purchaser prices available for national uses	
	⇩	
	Domestic uses: uses of RM products[1] by resident units	
	Final consumption	
	Gross capital formation	
	Intermediate consumption	
+	Gross capital formation of RM characteristic activities	
+	RM domestic transfers which are not a counterpart of previous items	Environmental subsidies and similar transfers
+	RM Transfers to the RoW	Environmental subsidies and similar transfers
–	RM Transfers received from RoW	Environmental subsidies and similar transfers
=	Domestic RM expenditure	

2.3 Eurostat: towards an integrated framework

Eurostat has recognised the shortcomings of the monetary activity accounts and has tried to provide new guidelines. These present the basis for an integrated framework that unify concepts and terminology across the modules of the monetary environmental accounts (MEA). The outcome of this work is described in the report 'integrating the monetary environmental accounts' (Eurostat 2015a), which was presented to the working groups on environmental accounting and environmental expenditures in March 2015. Below we summarize the main outcomes of this document.

An integrated framework for monetary activity accounts has several goals:

- Clarify and unify terminology across the modules of the monetary environmental accounts (MEA) by introducing a "one name for one definition"

[1] The handbook for EPE is currently being written by Eurostat and not yet available.

principle. This means that if two modules use different terms for the same concept, one single term should be adopted for it. Correspondingly, if two modules use the same term for different concepts, two different terms must be assigned.
- Clarify the relation between the MEA modules, namely EPEA, EGSS, ReMEA, and environmental transfers.
- Facilitate joint compilation of the MEA modules by enhancing the streamlining of the modules production and thus increasing efficiency of production work in the statistical offices.
- Make it easier for newcomers to understand the linkages between the various MEA modules.

The first goal is clarifying and unifying terminology across modules. This is approached with a new working device: a unifying conceptual layer across MEA modules. The idea is a) classifying environmental activities as characteristic or non-characteristic and b) environmental products as having primary or secondary purpose.

- Environmental activities that directly serve an environmental purpose are called **characteristic environmental activities**.

- Activities that produce specifically designed products whose use serves an environmental purpose are called **non-characteristic environmental activities**.

- **Primary purpose environmental products** mainly serve environmental protection or resource management.

- **Secondary purpose environmental products** primarily serve a non-environmental purpose, but may serve a secondary environmental purpose because they are specifically designed to be more environmentally friendly or more resource efficient than normal products of equivalent use.

Combining characteristic and non characteristic activities and primary and secondary purpose products leads to four categories of environmental products which can be mapped into the various terms in use for the product categories in the EGSS and environmental expenditure accounts (specific services, connected products and adapted products, environmental technologies). Subsequently, the four categories are further simplified into two, defined as follows:

- **Specific environmental products** would be all “primary purpose environmental products”. This category would comprise what in some modules is called characteristic (specific) environmental services and connected products. It would also comprise environmental technologies for the non-ancillary production of characteristic products as well as end-of-pipe technologies for ancillary environmental activities.

- **Cleaner and resource-efficient products** would be all "secondary purpose environmental products". This category would comprise what in some modules is called adapted goods. It would also comprise integrated technologies for ancillary environmental activities.

The second goal of the integrated framework is a neater interlink between MEA modules paving the way for their joint compilation. This is based on clarified and unified terminology, which makes it easier to compare the scope of the different MEA modules and identify which are the missing bits bridging the modules. Calculating those extra bits would be the next step. These calculations would have neutral burden because they would pay off in terms of synergies achieved when the modules are compiled as parts of a broader system.

The Eurostat work provides an important step towards harmonising the monetary activity accounts into an integrated framework. In the remainder of this study we would like to take it one step further and present an integrated set of environmental activity accounts.

3. Towards and integrated set of monetary activity accounts

3.1 Introduction

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

To develop an integrated set of monetary activity accounts no 'revolutionary' new set of accounts is needed. The EPEA tables, as described in SEEA CF, provide an excellent base for building such as system. In addition, the accounting logic that is followed in the EPE questionnaire from Eurostat and the new proposed guidelines by Eurostat to come to a harmonised framework provide the important building blocks for the integrated set of monetary activity accounts.

In this section we will describe how these integrated accounts may look like, namely a) the environmental production account, b) the environmental expenditure account, and c) the supply and use tables for environmental products.

3.2 Accounting logic of the EPEA

Before presenting the integrated set of accounts, it is worthwhile to discuss in detail the underlying accounting logic and how this relates to SNA. The accounting logic of the EPEA is directly linked to the three definitions of GDP, the production measure, the expenditure measure and the income measure of GDP (SNA2008, par. 16.47):

Output (basic prices)

minus intermediate consumption

plus taxes less subsidies on products

equals

final consumption

plus capital formation

plus exports

minus imports

equals

compensation of employees

plus consumption of fixed capital

plus taxes less subsidies on production and imports

plus net operating surplus

equals GDP

We can apply the first two identities to the scope of environmental activities:

Output ***of environmental goods and services (basic prices)***

minus intermediate consumption ***of environmental goods and services***

plus taxes less subsidies ***on environmental products and services***

equals

final consumption ***of environmental goods and services***

plus capital formation ***of environmental goods and services***

plus exports ***of environmental goods and services***

minus imports ***of environmental goods and services***

Equals ***net output of environmental goods and services***

When we reorganise the import and export items we get:

Output ***of environmental goods and services***

minus intermediate consumption ***of environmental goods and services***

plus taxes less subsidies ***on environmental products and services***

minus exports ***of environmental goods and services***

plus imports ***of environmental goods and services***

Equals : Environmental supply at purchasers' prices available for national uses

equals

final consumption ***of environmental goods and services***

plus capital formation ***of environmental goods and services***

Equals : National use of environmental products

Note that in this context 'intermediate consumption of environmental goods and services' is the intermediate consumption of environmental goods and services by producers of environmental goods and services. In addition 'final consumption of environmental goods and services' is not only final consumption by households and government, but also intermediate consumption of environmental goods and services by companies that are not producers of environmental goods and services.

Finally, the output of environmental goods and services by environmental production activities equals:

Intermediate consumption ***of environmental production activities***

Plus compensation of employees ***of environmental production activities***

plus consumption of fixed capital ***by environmental production activities***

plus taxes less subsidies on production and imports ***by environmental production activities***

plus net operating surplus ***of environmental production activities***

Adding this all together, we obtain accounts that are directly linked: the environmental production account and the environmental expenditure account. These accounts will be presented and discussed in more detail in the next sections.

3.3 The environmental production account

The 'environmental production account' presents information on the output of all environmental goods and services (specific environmental products and environment and resource efficient products) by the economy and how much of this output is available for domestic uses (see figure 3.3.1). 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).

Whether 'environmental production account' is the right name for this account may be a matter of debate. This account is more than the production account of the SNA, as it also includes the generation of income account and part of the supply and use tables. However, as this account mainly provides information on output of environmental goods and services according to different delineations (at basic prices, available for national uses), we consider this name the most appropriate.

In the **columns** a breakdown of the environmental production activities is provided. Following the proposal of Eurostat, characteristic and non characteristic activities are distinguished. For characteristic activities we propose to distinguish between a) Government and b) Corporations. Corporations may be broken down by a) principal and secondary activities and b) own account activities. We thus do not distinguish specialist producers. This issue is discussed in more detail in section 5.

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 described in section 3.2. 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). This item is discussed in more detail below. Finally, in row 21 a correction is made for the extra costs.

Intermediate consumption of environmental products by environmental producers

The intermediate consumption of environmental products by environmental producers (row 14) has to be excluded from the (gross) total environmental output to prevent double counting with regard to national environmental expenditure (SEEA CF; par 4.82). This applies for example to outsourcing of environmental services that is increasing in some particular domains of environmental protection. In the Netherlands, municipalities are responsible for waste management. Often, they subcontract partially or totally these services to private or public firms. As the output of these services is both recorded for the private company and the municipality, the output of the private company (which is used as intermediate consumption by the municipality) must be excluded to prevent double counting. This correction must also be done for non characteristic activities. For example, when the producer of windmills uses as input rotor blades (which is also an environmental product), then the output of the rotor blades must be excluded to prevent double counting.

In the example described above, the input of an environmental product is directly used to produce another environmental product. Sometimes, however, this relationship is not so clear. For example, companies producing resource efficient products (e.g. energy efficient washing machines), may also use some waste collection services from a private company to get rid of their waste. In this case, the waste services are not directly used as an input to produce other (waste) treatment services, and it may be argued that these waste services must not be excluded. However, we still recommend to exclude all intermediate consumption of environmental products by environmental producers to calculate the environmental output available for national uses. The main reasons for this are that a) in practice it may be very difficult to distinguish between the ‘direct input cases’ and the more ‘indirect input cases’ and b) the total monetary amount of the ‘indirect cases’ probably will be small.

Calculation of extra costs

In the expenditure account environmental expenditure has to be recorded following the extra cost criterion. Extra costs means that the costs of these products exceeding the costs of an equivalent ‘normal’ product that provides similar utility except for the impact on the environment. Accordingly, all cleaner and resource efficient products produced by characteristic and non characteristic activities are to be valued at extra costs in expenditure account (Eurostat, 2015). To link the environmental production account to the expenditure account the extra costs have to be calculated.

We propose that the environmental production account is valued at full cost. This is also consistent with the EGSS, which is valued at full costs. Accordingly, at the bottom of the account a correction has to be made to make the transition to the extra cost criterion. The extra cost correction is equal to the output at full costs minus the output at extra costs. This value this has to be subtracted to arrive at Environmental output at purchasers' prices available for national uses: extra costs (row 22).

3.3.1 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						

3.4 Top part of the expenditure account

The top part of the environmental expenditure account (rows 1-10) describes the domestic use of environmental products (Figure 3.4.1). 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.

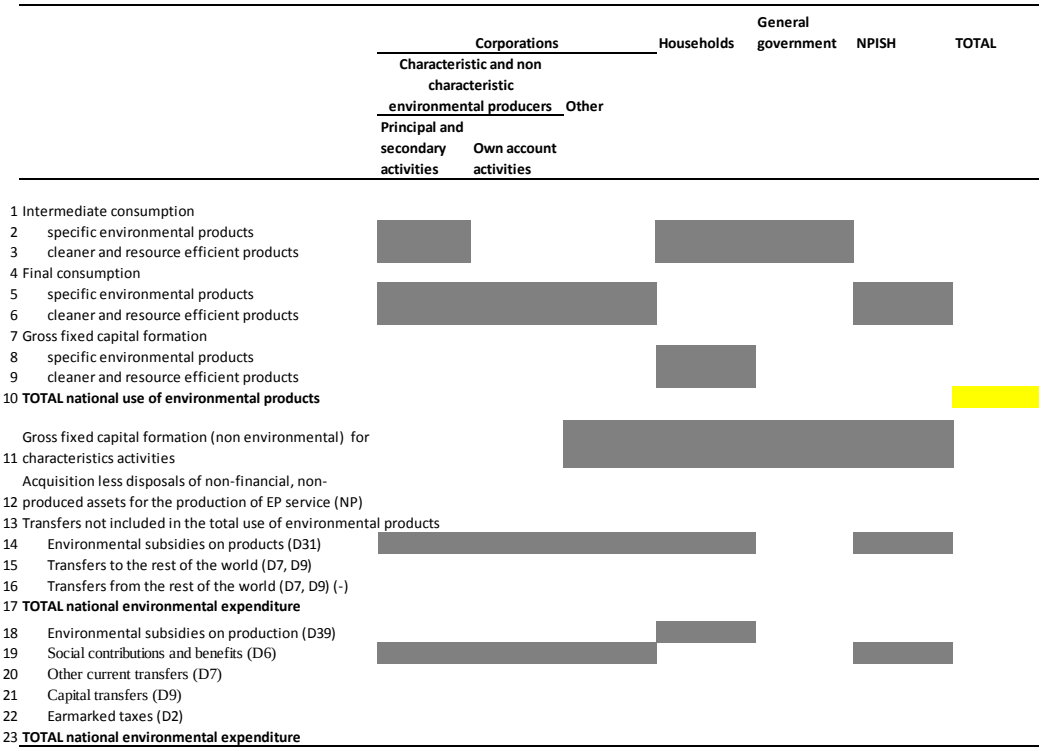
In the **rows** intermediate consumption, final consumption and gross fixed capital formation is distinguished. These can each be are further disaggregated into specific environmental products and cleaner and resource efficient products.

Note that intermediate consumption of environmental products by characteristic and non characteristic activities in the expenditure account is **NOT** by definition zero (In SEEA CF these cells were marked as 'not included' in the national expenditure aggregate). It is true that this item has already been excluded in the bottom part of the production account in order to calculate the net environmental output. However, intermediate consumption of environmental products may also originate from imports

(which are added in the bottom part of the production account), and in this case its use should also be recorded in the expenditure table. In practice, it will be difficult to establish what part of intermediate consumption by characteristic and non characteristic activities comes from imports.

The two dimensional environmental expenditure account does not allow any specification of CEPA and CReMA in the rows or columns: the accounts thus have to be complied separately for each individual CEPA and CReMA category (and their totals).

3.4.1 Environmental expenditure account



3.5 Bottom part of the expenditure account

The bottom part of the expenditure account (rows 11-23) exists 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.

3.5.1 Calculating total national expenditure

The total national uses of environmental products (top part of the expenditure account) is not equal to the total national expenditure. Three items have to be added to obtain the total national environmental expenditure, namely a) gross fixed capital formation (non environmental) for characteristics activities, b) acquisition less disposals of non-financial, non-produced assets for the production of EP service (NP) and c) transfers not included in the total use of environmental products.

1) Gross fixed capital formation for characteristics activities (non environmental)

All gross fixed capital formation by characteristic activities is part of national environmental expenditure. For the proposed structure of the integrated framework, part of this GFCF are environmental investments that are already recorded in the top part of the account. So, in row 11 only the non-environmental GFCF has to be recorded.

2) Acquisition less disposals of non-financial, non-produced assets for the production of EP service

Acquisition less disposals of non-financial, non-produced assets for the production of EP service (NP) is also part of national environmental expenditure. This is for example land bought for nature conservation.

3) Specific transfers not included in the total use of environmental products

In the integrated framework all environmental related transfers have to be accounted for. In the bottom part of the expenditure account those transfers between economic units have to be included that affect the level of spending on environmental protection but are not recorded in the total national uses of environmental products recorded in the top part of table (SEEA CF par 4.84). Specific transfers relating to EP expenditures are often already recorded in the chief of the receiver or the payer. Therefore, adding the transfer payments in such cases would lead to double counting.

The SEEA CF and Eurostat compilation guides (Eurostat, 2007; Eurostat, 2014b) are not altogether clear what to include or exclude here. Below, we have tried to provide this overview by looking at all relevant transfers and discuss whether these transfers are already included in the national environmental uses as recorded in the top part of the account, or not. As transfers to and from the rest of the world are specifically mentioned, we them describe them separately.

Environmental subsidies (D3)

Subsidies (D3) are defined in ESA (§ 4.30) as 'current unrequited payments which general government or the institutions of the European Union make to resident producers' (Eurostat, 2015b). Subsidies are further classified into:

1. Subsidies on products (D31), including import subsidies (D311) and other subsidies on products (D319).
2. Other subsidies on production (D39).

Subsidies on products (D31) are subsidies payable per unit of a good or service produced or imported. Environmental subsidies on products reduce the price paid by purchasers, in relation to the basic prices. An example is the subsidy on renewable energy (CReMA13), where the producers of renewable receive this subsidy to promote the production of renewable energy and cover the extra costs involved. Therefore, the expenditure recorded for the use of these products in the total national uses of

environmental products is undervalued in relation to the economic resources necessary for their supply. **Conclusion:** ***The expenditure related to environmental subsides on products is not covered in the total national use of environmental products and thus has to be added to calculate the total national expenditure.***

Intermezzo: what about environmental taxes on products, the counterpart of environmental subsidies on products? Would it be logical to also include them somehow here? The answer is no: these taxes are (usually) not earmarked taxes. The revenues go to the general government budget and are thus not directly used to finance environmental activities.

Other subsidies on production (D39) consist of subsidies other than subsidies on products which resident producer units may receive as a consequence of engaging in production. This includes for example subsidies to reduce pollution, i.e. to cover some or all of the costs of additional processing undertaken to reduce or eliminate the discharge of pollutants into the environment (Eurostat, 2015b).

These subsidies are aimed at covering (partially) the costs to produce EP services. For example, farmers may receive a subsidy to produce their crops in a more environmental friendly. For this, framers have to produce an environmental service (own account activity) which is to be recorded in the top part of the expenditure account as intermediate consumption of this service. **Conclusion:** ***The expenditure related to environmental subsides on production is covered in the total national uses of environmental products and thus has not to be added to calculate the total national expenditure.***

Social contributions and benefits (D6) are defined in ESA (§ 4.83) as 'transfers to households, in cash or in kind, intended to relieve them from the financial burden of a number of risks or needs, made through collectively organised schemes, or outside such schemes by government units and NPISHs (Eurostat, 2015b).

An example of social contributions and benefits related to the environment is the contribution paid by government to households to finance the isolation of houses. In this case the full expenditure for isolation is already recorded in the final consumption of households. **Conclusion:** ***The expenditure related to social contributions and benefits is covered in the total national uses of environmental products and thus has not to be added to calculate the total national expenditure.***

Other current transfers (D7) are also current transfers. Their treatment is the same as subsidies on production: they finance (partly) an economic activity which expenditure ***is already covered in the total national uses of environmental products and thus has not to be added to calculate the total national expenditure.***

Capital transfers (D9) in cash 'consists of the transfer of cash that the first party has raised by disposing of an asset, or assets (other than inventories), or that the second party is expected, or required, to use for the acquisition of an asset, or assets (other than inventories). Capital transfers include investment grants (D9 and other capital transfers). Environmental capital transfers are often aimed at covering (partially) the expenditure related environmental investments. In the top part of the expenditure account total environmental gross fixed capital is recorded, part of this expenditure

may be financed by a capital transfer, the rest of the expenditure is for the company. ***Conclusion: The expenditure related to capital transfers is already covered in the total national uses of environmental products and thus has not to be added to calculate the total national expenditure.***

Environmental transfers to the rest of the world (current and capital) usually occur between the government and the ROW as a kind of developing aid to other countries. Its aim it to support environmental activities abroad. Examples include direct support or investment grants for environmental investments abroad. As the expenditure of environmental products/ services/ gross capital formation occurs abroad, this in not recorded in the top of the expenditure account. Conclusion: ***The expenditure related to environmental transfers to the ROW is not covered in the total national uses of environmental products and thus has to be added to calculate the total national expenditure.***

Environmental transfers from the rest of the world (current and capital) are used to finance domestic environmental activities. This monetary flow may go to government, but may also go directly to corporations (and households?). Either way, the expenditure related to the environmental activities that are supported should already be recorded in the total national uses of environmental products. Let's take as an example an Eurostat grant paid to statistics Netherlands to improve its environmental accounts (!). Its related expenditure should be recorded as final consumption of the government and is thus part of the total national uses of environmental products. However, total national environmental expenditure is defined as the total expenditure for the environment by resident units. If part of the expenditure is financed from the rest of the world, this has to be corrected for. Accordingly, environmental transfers from the rest of the world should be subtracted from the domestic use of environmental products to calculate the national environmental expenditure. Conclusion: ***The expenditure related to environmental transfers from the ROW should be included as a negative value .***

We conclude that the following transfers have to be added in the bottom part of the expenditure account to calculate total national environmental expenditure: a) environmental subsidies on products, b) environmental transfers to the rest of the world, and c) environmental transfers from the rest of the world.

3.5.2 Financing of national environmental expenditure

National expenditure by sector (row 17) does not provide the right insight who is financing this expenditure. This can be achieved by adding rows for several kinds of transfers (subsidies, capital transfers, earmarked taxes etc.) in the bottom part of the environmental expenditure account. These transfers only redistribute environmental expenditure over the different sectors, without changing the total national environmental expenditure. The values may thus be positive (for the payer of the transfer) or negative (for the receiver of the transfer).

Here we have added rows for the following categories:

- Subsidies on production (D39)
- Social contributions and benefits (D6)

- Other current transfers (D7)
- Capital transfers (D9)
- Earmarked taxes (D2)

Implicit subsidies are not included because they are not part of total national expenditure. However, these may be added as a separate item at the bottom of the account. This is also the case for environmental taxes in general, which are discussion in more detail in section 5.

3.6 Supply and use tables for environmental products

Supply and use tables for environmental products show how environmental products are produced and imported on the one hand, and how these products are used by companies, households and government and exported on the other hand. The tables follow the format of the 'general' monetary supply and use tables of the SNA. The supply and use tables go beyond the production and expenditure accounts presented previously in a sense that they add the product dimension level, i.e. they provide information on supply and use of 'individual' environmental product categories (see also discussion in section 5).

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. We present here two types of supply and use tables, which basically differ with regard to how the columns for corporations are classified. Below we will first describe the supply and use tables where corporations are classified according to NACE.

3.6.1 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											

The columns in the supply table show :

a) Environmental output at basic prices at NACE level (including a column for total),
b) Taxes less subsidies on products. This is subdivided into environmental and non-environmental taxes less subsidies. In the columns taxes may also be shown separately from subsidies.
c) Trade and transport margins on environmental products
d) Imports of environmental products
e) Total supply of environmental products

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)

Alternative format for the supply and use tables

An alternative format for the supply and use tables classifies corporations not according NACE, but according to the same column division as in the production and expenditure account. As characteristic activities are now directly identified in the columns, it is not needed to have this category in the rows. Accordingly, the rows have only specific environmental products, cleaner/ resource efficient products and the CEA classification.

The main advantage of this alternative format is that the same format for environmental activities is used as in the production and expenditure account. Accordingly, data from the supply and use tables can be directly used for the compilation of these tables. Disadvantage is that these tables do not provide NACE information.

It is of course also possible to construct both types of supply use tables. In section 4 it will be shown that it is rather easy to go from type I (with NACE classification for corporations) to type II (with institutional sector classification).

3.6.2 Supply and use tables for environmental products (alternative format)

SUPPLY	Characteristic activities			Non characteristic activities	Total output basic prices	Taxes less subsides on products		Trade and transport margins	Output at purchasers' prices	Imports	Total supply
	Government	Corporations		Corporations							
		principal and secondary activities	own account activities			environ-mental	non environ-mental				
Specific environmental products											
CEPA 1											
CEPA…..											
CreMA 1											
CreMA….											
Cleaner and resource efficient products											
CEPA 1											
CEPA…..											
CreMA 1											
CreMA….											
TOTAL											

USE	Corporations			Total intermediate consumption	Final consumption		Gross fixed capital formation	Exports	Total use
	Characteristic and non characteristic environmental producers								
	Principal and secondary activities	Own account activities	Other		Government	Households			
Specific environmental products									
CEPA 1									
CEPA…..									
CreMA 1									
CreMA….									
Cleaner and resource efficient products									
CEPA 1									
CEPA…..									
CreMA 1									
CreMA….									
TOTAL									

3.7 Indicators from the integrated set of accounts

Below we provide an overview where the main indicators/ data items from the separate monetary modules can be found in the integrated set of environmental activity accounts. Also we indicate when specific data items are *not* part of the accounts. All indicators can be disaggregated to CEPA/CReMA classes (this is not mentioned separately).

EGSS

- Total output in basic prices: Production account (row 11)
- Total output by NACE categories: Supply table (bottom row)
- Total value added: Production account (row 5)
- Total value added by NACE category: Production account (***if this account is further disaggregated to NACE categories)***
- Total export: Use table (column for exports) and production account (row 23)
- Total export by NACE category: ***not part of the integrated system,*** supply and use tables do not allow identification of export by NACE, this is done in the input output tables. However,

- Total employment: ***not part of the integrated system*** (not monetary values). Data can be added as a supplementary item in the environmental production account (row 23 in figure 3.3.1).

EPE

- Total environmental output at purchasers' prices available for national uses: production account (row 22) and the expenditure account (row 10)
- Total National environmental expenditure: expenditure account (row 17)
- Total National environmental protection expenditure (row 17): expenditure account (only the CEPA classes)
- Total National resource management expenditure (row 17): expenditure account (only CReMA classes)
- Total environmental expenditure by sector/NACE: expenditure account (row 17) (***if this account is further disaggregated to NACE categories***)
- Total environmental gross fixed capital formation: expenditure account (row 7, or 8 plus 9) and use table (column for gross fixed capital formation).
- Total environmental gross fixed capital formation by sector/NACE(row 7, or 8 plus 9): expenditure account (***if this account is further disaggregated to NACE categories***)
- Financing of National expenditure by sector: expenditure account (row 23)

Environmental taxes and environmental transfers

- Total subsidies (D3) received: expenditure account (row 14 and 18)
- Total current and capital transfers received: expenditure account
- Total transfers received from and paid to ROW: expenditure account (row 15 and 16)
- Total earmarked taxes paid: expenditure account (row 22)
- Transfers by NACE: expenditure account (***if this account is further disaggregated to NACE categories)***
- Total environmental taxes paid: ***not part of the integrated system.*** Could be added as a supplementary item in the expenditure account. See discussion in section 5.
- Environmental taxes paid by NACE category: ***not part of the integrated system.*** Could be added as a supplementary item in the expenditure account. See discussion in section 5.

EXTRA indicators that are not provided by the individual modules

- Total imports: supply table (and bottom part of production account)
- Total output of environmental specific products and cleaner and resource efficient products (supply table)

- Total intermediate consumption of environmental specific products and cleaner and resource efficient products (use table)
- Total final consumption households / government of environmental specific products and cleaner and resource efficient products (use table)
- Total gross fixed capital formation of environmental specific products and cleaner and resource efficient products (use table)

4. Conclusions and recommendations

An integrated set of environmental activity accounts can be built based upon a) the EPEA framework as presented in SEEA CF, b) the accounting structure proposed by Eurostat for the EPE/ReMEA modules, c) the harmonised set of definitions proposed by Eurostat (Eurostat, 2015a). The integrated set of accounts consists of two sets of accounts:

a) Environnemental production account – environmental expenditure account. These accounts are directly linked to each other by the item 'total environmental output at purchasers' prices available for national uses'.
b) Supply and use tables for environmental products. These accounts are directly linked to each other by the supply use relationships.

The practical application of the integrated set of tables showed that full integration is feasible and has several advantages:

- **Full consistency between the modules:** data for production of environmental goods and services (EGSS) en environmental expenditure (EPE) and its financing (transfers) is fully consistent.
- **Coherent data:** (with SNA). Using the same concepts and classifications, data can be directly compared to SNA data, such as GDP, total GFCF etc.
- **Comprehensive data:** Applying the accounting structure with the columns and rows as defined here ensures full coverage of environmental activities and products.
- **Increased compilation efficiency:** There is a large overlap between EPE and EGSS. Putting data into an integrated framework helps to compile the different modules more efficiently, as this ensures that data are not compiled twice. Synergy is achieved when the modules are compiled as parts of a broader system.

These characteristics of the integrated accounts also increase international comparability of the data if all countries would apply such an approach.

The set of integrated accounts as proposed here also still has some 'weak' points. Not all transfers are included (full scope of environmental taxes, implicit subsidies). In addition, the production and expenditure accounts are compiled on institutional sector

level and thus does not allow the derivation of data on NACE level. However, in principle it is possible to disaggregate these accounts also to NACE.

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