SEEA Technical Note: Environmental Protection Expenditure Accounts

September 2022

SEEA Technical Notes

This note is a part of a series of Technical Notes prepared to support the development of data based on the System of Environmental Economic Accounts (SEEA) Central Framework, the first international standard in environmental economic accounting. Since SEEA is not a single account but a series of modules, the accounts in each of the various modules can be developed separately in accordance with the priorities and the resource availability in each country.

The series of Technical Notes is comprised of one note addressing general issues that cut across domains focusing on processes and operational aspects that encourage efficient implementation of the standard and associated data compilation exercises and a number of notes on specific topics. It is recommended that those wishing to develop data related to any of these specific topics should read the general process note in conjunction with the note on the specific topic to be developed.

These notes summarize the data requirements and other operational considerations designed to provide sufficient guidance to initiate the development of the accounts. The notes also provide reference information for additional publications that will support the full development of the accounts and provide information on extensions and linkages that can be exploited once the accounts and tables are in place.

Contents

I. Introduction

1. The general purpose of SEEA Technical Notes is to summarize the key features for a given topic to support countries in the implementation of the SEEA and provide initial guidance to countries wanting to implement the specific SEEA module. This technical note provides an overview of the Environmental protection expenditure accounts (EPEA) based on the System of Environmental Economic Accounting 2012 Central Framework (SEEA CF) which was adopted by the United Nations Statistical Commission in 2012 as the international statistical standard for environmental-economic accounts. Furthermore, the UN Committee of Experts on Environmental-Economic Accounting (UNCEEA) approved in its 2018 meeting an integrated framework for economic environmental accounts as state of the art of functional accounts (SEEA CF, chapter IV).[1] This technical note follows the integrated framework.

2. Environmental protection expenditure accounts (EPEA) quantify the resources devoted by the country for environmental protection. The EPEA considers several categories of expenditure: consumption (current expenditure) and investment (capital expenditure); distinguishing expenditure by the business sector, government sector and by the households. Besides expenditure, EPEA also records some information about financing, in particular international flows of financing for the purpose of environmental protection.

3. EPEA provides estimates of total environmental expenditure and expenditure about specific environmental aspects such as (management of) biodiversity or waste management. Many users are only interested in expenditure on specific environmental areas. EPEA also provides this information, based on the classification of environmental activities.

4. EPEA uses definitions of consumption and investment from the System of National Accounts (SNA). This takes advantage of the very precise SNA definitions, treatment of borderline cases, etc. It also allows comparing and integrating EPEA results with SNA aggregates to produce indicators, shares, etc. This design decision makes the concepts in EPEA very technical, e.g. categories of consumption will be SNA final consumption and intermediate consumption, and instead of 'investment', EPEA will use the concept 'gross fixed capital formation'. Those concepts are introduced below. The statistical units and institutional sectors in EPEA are also those in the SNA. Some methodological elements for EPEA do not exist in SNA, such as the functional classification of environmental protection activities (CEPA) or the concept of specialist producers of environmental protection. The EPEA estimates are consistent with the estimates found in the SNA with the exception of the treatment of some own account activities which are explicitly included in the EPEA for completeness of coverage.

5. EPEA is therefore a single accounting framework encompassing different types of expenditure (consumption, investment), different environmental purposes (biodiversity, waste management, etc.) by all concerned stakeholders (businesses, government, households, etc.). This provides for comprehensive datasets and more robust estimates than a non-accounting approach. However, it

[1] Cover document (https://seea.un.org/sites/seea.un.org/files/briefing_note_for_unceea_-_integrated_framework_sv_002.pdf) and detailed document (https://seea.un.org/sites/seea.un.org/files/seea_paper_integrated_framework_estat_v5.pdf)

comes at the cost of being more demanding in terms of data sources needed to complete the account. It is also demanding in terms of methodology, definitions, concepts, statistical units and classifications, as will be shown below. For these reasons, EPEA is a challenging SEEA account and not necessarily a starting point for compilers.

6. The EPEA are one of the SEEA environmental activity accounts. Environmental activity accounts record the transactions in monetary terms between economic units that may be considered environmental (SEEA CF, chapter IV). The EPEA has strong links with other SEEA environmental activity accounts, in particular with the Environmental goods and services sector (EGSS) and the Environmental subsidies and similar transfers accounts.

7. This Technical Note describes the main features of the SEEA accounts for environmental protection expenditure, and presents a set of core accounts which comprise an adapted version of the accounts as presented for the EPEA in the SEEA Central Framework to focus and guide initial compilation. Section II is a brief presentation of the main conceptual elements and features of EPEA. Section III describes the EPEA Core account and main aggregates. The Core account represents a minimum set of information which countries should aim to compile and report, explicitly identifying the most important data items for the module at hand. Countries may often wish to extend the minimum level of detail in areas deemed particularly policy relevant. Section IV provides highlights of such possible extensions and also EPEA links with other SEEA environmental activity accounts. Section V presents a combined presentation for EPEA with other SEEA and SNA accounts. This combined presentation provides countries with a template to present and disseminate an aggregated set of key information relevant to the module at hand from a range of sources (including the SEEA and SNA). The information included in the combined presentations are data items which are of key relevance to policy makers and which, often in combination, are used to calculate particularly important indicators (including the Sustainable Development Goals (SDG) indicators). Section VI provides an overview of the data sets required to produce the core tables including the data sources and compilation methods. Section VII provides references and links to supporting material.

II. SEEA CF accounts for environmental protection expenditure

Scope

8. The domain of study of EPEA is the *environmental protection*. SEEA CF defines environmental protection 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. An example is manufacture of exhaust pipes for motor vehicles. Environmental protection activities and actions also include all measures taken in order to restore the environment after it has been degraded. An example is rehabilitation of mining sites. 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 are excluded from this definition. An example is manufacture of rubber gloves. It is noteworthy that SEEA CF also defines other environmental activities different from environmental protection, in particular resource management, but those are beyond the scope of EPEA and are addressed in other environmental activity accounts (see Section IV about extensions and links).

9. Central in EPEA is the expenditure on environmental protection *products*. Products can be goods or services. Environmental services are more frequent. This document will refer to *environmental products* to keep explanations general. Environmental protection products are produced, designed and manufactured for purposes of environmental protection. An example of environmental protection service is waste collection and treatment. An example of environmental protection good is an instrument to measure pollution. Products whose primary purpose is environmental protection are called **specific (environmental protection) products**. An example of specific product is waste management. Certain 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 products**. Examples of cleaner products are organic farming, low sulphur fuels, mercury-free batteries and CFC-free products. EPEA records both specific and cleaner products, but separately.

10. Expenditure for environmental protection consists largely of expenditure in environmental protection services and goods, but it also includes expenditure in other products incurred by the producers of environmental protection services and goods during their activities. The former is called 'expenditure in environmental protection activities' for short. An example is management of forests. The EPEA encompass both environmental protection activities that directly serve an environmental protection purpose (also called characteristic activities) and activities which do not directly serve an environmental protection purpose but which produce specifically designed products whose use serves an environmental protection purpose (also called non-characteristic activities). An example of non-characteristic activity is a taxy company running low-emissions vehicles; its main activity is transportation, which is not necessarily environmental, but it is done in a more environmentally-friendly way. National compilers may wish to distinguish between characteristic and non-characteristic environmental protection activities for compilation and presentation purposes, but this is not a feature of the Core account.

Statistical units

11. The EPEA use the statistical units from the SNA. Probably the most central unit is the so-called **institutional unit,** which is defined as "an economic entity characterised by decision-making autonomy". Institutional units with homogeneous economic behaviour are grouped into institutional sectors. The **institutional sectors** in the SNA are: non-financial corporations, financial corporations, general government, households, non-profit institutions serving households, and the rest of the world. For simplicity, EPEA further groups them into corporations (non-financial and financial), general government (including non-profit institutions serving households), households and the rest of the world.

12. Because the EPEA address (the expenditure during) environmental protection activities, which are related to the production of environmental protection products, some SNA concepts about production and products are necessary. The following is a very short introduction of key terms. In particular, environmental protection activities can be **market**, **non-market** or **for own final use** (see definitions in SNA). Environmental protection activities can be executed as **principal**, **secondary** or **ancillary activities** of the corresponding production unit (see SNA). Ancillary environmental activities are supporting activities undertaken within an enterprise in order to create the conditions within which the principal or secondary activities can be carried out, e.g. in-house treatment of waste water by businesses. Ancillary environmental activities are recorded in EPEA more explicitly than in

SNA in order to provide a more complete picture of environmental protection.

13. In the EPEA, **specialist producers** are those producers whose principal activity is the production of environmental protection products. An example is a company collecting waste. Secondary environmental protection producers produce environmental protection products as secondary activity. An example is a company that produces pumps, both general-purpose pumps (which are not an environmental protection product) and pumps for use in wastewater treatment (which are an environmental protection product). There are also ancillary environmental protection producers, which produce environmental products as ancillary activity. An example is a mining company that rehabilitates its mining sites at the end of the site operations. Specialist producers can be found in the corporate sector or in the government sector, but this Technical Note reserves this term for those producers in the corporate sector, i.e. they are reported separately in the tables and accounts. Secondary producers and ancillary producers in the corporate sector are frequently reported together. Specialist producers in the government sector are reported as part of the government sector. All the categories of producers in the government sector are reported together, with no distinction between specialist and secondary producers.

14. The concept of specialist producers serves two purposes in EPEA. First is practical compilation: the estimates for specialist producers may be simpler to produce and more accurate. Specialist producers are easier to identify (e.g. based on the business name or its classification in ISIC), are 'clustered' in (homogeneous) industries and are responsible for a fair share of environmental production. It is also possible to take assumptions about their production structures with lower risks, e.g. assume that all their investment (capital formation) is for environmental protection production. On their side, secondary producers and ancillary producers are scattered across many economic activities (in the sense of ISIC) and harder to identify but responsible for a share of production too big to be ignored. A second reason is conceptual: as will be seen in Section III, the intermediate consumption of specific products by specialist producers is a special variable to derive the main aggregate National expenditure on environmental protection.

Classifications

15. The transactions in environmental protection products can be disaggregated by their functional purpose using the Classification of Environmental Activities and Expenditure (CEPA) as presented in Table 1. This is essential for EPEA to inform users only interested in some categories of environmental expenditure, e.g. expenditure on protection of biodiversity. (NB: CEPA is currently under review, as part of the SEEA CF research agenda)

Table 1 Classification of Environmental Activities: overview of groups and classes

Group	Classes
I: Environmental Protection (EP)	1 Protection of ambient air and climate
	2 Wastewater management
	3 Waste management
	4 Protection and remediation of soil, groundwater and surface water
	5 Noise and vibration abatement (excluding workplace protection)
	6 Protection of biodiversity and landscapes
	7 Protection against radiation (excluding external safety)
	8 Research and development for environmental protection
	9 Other environmental protection activities

16. Another classification used in the EPEA is the International Standard Industrial Classification (ISIC), which is a classification of productive activities. It is also used to group production units by industries engaged in the same principal activity, e.g. to know expenditure on environmental protection by construction companies. Contrarily to CEPA, which is used to classify any EPEA variable, ISIC is only used to classify production activities and production-related characteristics such as output, employment, intermediate consumption, gross fixed capital formation, etc. but not final consumption nor transfers. ISIC can be useful for compilation and dissemination purposes, but the core accounts presented in Section III do not use it for reporting results. ISIC has 88 categories at division (2-digit) level, which is probably too exigent for EPEA compilers. For this reason aggregating divisions is frequent practice.

III. Core accounts and aggregates for the EPEA

17. The EPEA as presented in the SEEA CF consists of four interlinked accounts. The first account presents information on the production of environmental protection specific services by resident producers. The second is a supply and use table for these specific services. The third account broadens the scope of the previous accounts to include cleaner products purchased by resident units, expenditure for the production of environmental protection products and international environmental protection transfers. The inclusion of these flows allows for an estimate of the total national expenditure on environmental protection (NEEP), which is a main EPEA aggregate. The fourth account presents in more detail the flows of financing on environmental protection between the sectors in the national economy and with the rest of the world.

18. Estimating and reporting data on the full set of accounts as presented in SEEA CF is a challenging effort; therefore, this Technical Note presents one simplified Core account that summarizes key information for initial efforts on compiling EPEA, in particular to calculate the key aggregate National expenditure on environmental protection (NEEP). The other three accounts presented in the SEEA CF can be compiled with the extensions and links introduced in Section IV.

19. The National expenditure on environmental protection is the sum of the following components:

    1) all expenditure by resident units on environmental protection goods and services, i.e. either as final consumption, intermediate consumption or gross fixed capital formation (these concepts are explained below).

    2) the expenditure needed for the production of environmental protection products, in particular the capital expenditure (i.e. gross fixed capital formation, this concept is explained below). This is expenditure in non-environmental protection products, otherwise it is already recorded in the previous item. This second item of NEEP provides for a more comprehensive measure of expenditure related to the environmental protection.

    3) the net international financing of environmental protection expenditure, i.e. financing by resident units paid to the rest of the world less transfers received by resident units from the rest of the world, insofar those are not already capture in the other elements, to avoid double counting. In SNA, such financing flows are called ‘transfers’, as will be seen below.

20. Thus, the NEEP can be broken down in several components for analysis: by type of expenditure (final consumption, intermediate consumption, gross fixed capital formation, transfers); by sector incurring expenditure (corporations, government, households), by type of environmental protection function (classification CEPA), by economic activity of the unit incurring expenditure (classification ISIC), etc. NEEP is constructed in a way that avoids double counting and makes the sum comparable to SNA aggregates such as the gross domestic product (GDP), the gross national income (GNI), expenditure and consumption by institutional sector, etc.

21. The Core account reports the expenditure by resident units in the country. The columns report the institutional sectors incurring the expenditure, including the 'rest of the world', which is the counterpart for international flows.

Core account: Expenditure for environmental protection purposes

		Corporations			Government	Households	Rest of the world	TOTAL
		EP producers		non-EP producers				
		specialist producers	other producers					
1	Intermediate consumption on EP products (*)	2 900	400	1 000	4 000			8 300
2	*specific environmental protection products*	*2 600*	*300*	*700*	*1 100*			*4 700*
3	*cleaner products*	*300*	*100*	*300*	*900*			*1 600*
4	Final consumption on EP products				1 400	4 700		6 100
5	*specific environmental protection products*				*1 250*	*4 150*		*5 400*
6	*cleaner products*				*150*	*550*		*700*
7	Gross fixed capital formation on EP products	2 600	2 100	1 000	2 900			8 600
8	*specific environmental protection products*	*1 800*	*1 400*	*650*	*1 900*			*5 750*
9	*cleaner products*	*800*	*700*	*350*	*1 000*			*2 850*
10	**TOTAL use of EP products by resident units**	5 500	2 500	2 000	8 300	4 700		23 000
11	Gross fixed capital formation (on non-EP products) for EP production	1 900	1 500		1 000			4 400
12	Acquisition less disposals of non-financial, non-produced assets for EP production	50	NA		NA			50
13	Transfers not included in the total use of EP products						100	100
14	Transfers to the rest of the world (+)						800	800
15	Transfers from the rest of the world (-)						700	700
16	**TOTAL national environmental protection expenditure**	7 450	4 000	2 000	9 300	4 700	100	27 550
	Supplementary item							
17	Intermediate consumption of EP products by EP producers	1 700	NA		805			2 505

(*) Item 1 is net of item 17 to avoid double-counting

22. The columns report the institutional sectors responsible for the expenditure. The corporate sector is further broken down in specialist producers (i.e. producers whose principal activity is environmental protection), other producers (i.e. which engage in environmental protection as their secondary or ancillary activities) and other corporations which are not producers of environmental protection but have expenditure in environmental protection products. Alternative breakdowns or groupings are possible, for instance 'other producers' in the corporate sector may be split in secondary producers and ancillary producers.

23. The top part of the Core account (rows 1-10) reports the expenditure on environmental protection products by resident units. The expenditure may concern specific environmental protection products or cleaner products.

24. The expenditure consists of consumption (intermediate consumption, final consumption) or investments (gross fixed capital formation). These are SNA concepts. **Intermediate consumption** consists of goods and services used up in the course of production. Only producer businesses and government units can have intermediate consumption, because of the SNA accounting rules. **Final consumption** consists of goods and services used by individual households or the community to satisfy their individual or collective needs or wants (in the latter case the expenditure is accounted as government expenditure). Businesses cannot have final consumption, because of the SNA accounting rules. **Gross fixed capital formation** (also known as investments) is defined as acquisitions less disposals of fixed assets. Fixed assets are produced assets (such as machinery, equipment, buildings or other structures) that are used repeatedly or continuously in production over several accounting periods (more than one year); however non-produced assets (such as land) are not fixed assets in SNA, and correspondingly are not gross fixed capital formation. Thus a different entry is needed for acquisitions less disposals of non-produced assets (see row 12 in the Core account). Gross fixed capital formation, like intermediate consumption, is only applicable to economic units in their capacity as producers, i.e. to businesses and government units. The distinction between intermediate consumption and gross capital formation depends on whether the goods and services involved are completely used up during the year or not. These are all SNA definitions. See SNA for further details.

25. Examples of gross fixed capital formation for environmental protection (row 7), are machinery and instruments for environmental protection, research and development (R&D) (in that R&D is considered capital formation in the SNA) or expenditure leading to improvements in land which are treated as gross fixed capital formation in the form of land improvements.

26. Some environmental protection products may be used as intermediate consumption during production processes to create new environmental protection products, which may reach a final use either as final consumption or as gross fixed capital formation. For example, during the production of waste treatment services there may be intermediate consumption of waste collection; both waste collection and waste treatment are environmental protection activities. In such eventuality, there would be double-counting the value of the products used as on the one hand as intermediate consumption and on the other hand as final consumption or gross fixed capital formation. In order to avoid double counting, the intermediate consumption in such products is excluded from NEEP. In practice the products concerned may be challenging to estimate; the simplest and most cost-effective solution is estimating and deducting the intermediate consumption of environmental protection products by specialist producers. The presentation of the Core account in rows 1-3 assumes that these products have already been deduced during the compilation process. Otherwise said, this is implicit in rows 1-3. However it can be explicitly shown as a *pro memoria* item, as done in row 17.

27. EPEA measures the expenditure at purchasers' prices, which is the same principle for expenditure valuation as in SNA. Purchasers' prices are the amounts paid by the purchasers, excluding the deductible part of value added type taxes.

28. For cleaner products, which do not serve a primary environmental protection purpose, EPEA is foremost interested in the 'environmental protection share' of their value, which can be measured by the extra cost of the cleaner product compared to an equivalent normal product. For instance, considering an organic fruit as a cleaner product, EPEA would only record the extra cost compared to a non-organic fruit. This valuation principle is known as **extra costs valuation**. Intermediate consumption, final consumption and gross fixed capital formation of cleaner products must be valued at extra costs. Expenditure on specialist products is valued at their full costs instead. For instance, expenditure on waste treatment is recorded at full costs.

29. The next part of the Core account (rows 11-12) reports expenditure other than in environmental protection products, which is also part of the national expenditure on environmental protection. Row 11 reports gross fixed capital formation for the production of environmental protection by specialist producers or secondary producers. An example is any acquisition of a (normal) building to host environmental protection activities by specialist producers or secondary producers. Please note that gross fixed capital formation on environmental protection products is already reported in row 7, therefore there is no overlap between the concepts reported in rows 7 and 11. Row 12 reports the acquisitions less disposals of non-produced assets, mostly land. As explained above, this item is a type of 'investment' different from gross fixed capital formation under SNA. This item usually is only related to land purchased for environmental protection activities, e.g. to make of it a natural wildlife reserve (CEPA 6).

30. The final three rows in the Core account (rows 13-15) present financing flows for environmental protection to and from the rest of the world, plus their net balance. They correspond to the transfers for international cooperation in the field of environmental protection. SNA uses the concept 'transfers' for financing flows, i.e. a transfer is a transaction in which one institutional unit provides a good, service or asset to another unit without receiving from the latter any good, service or asset in return as a direct counterpart. This includes financing for straight payments (current transfers) and financing for the acquisition of assets (capital transfers). Whereas EPEA records certain financing flows, this recording is underdeveloped as compared to expenditure, as can be seen from the rows in the Core account devoted to one or the other. There are other SEEA accounts specialised on financing, in particular about environmental taxes and environmental subsidies and similar transfers. More about it in Section IV.

31. Transfers can be financed either by the government, international organizations, corporations or by households through non-governmental organizations. The simplified Core account does not disclose information on who is the financing sector and focuses instead only on the flows between the country (i.e. national total) and the rest of the world. This measures 'foreign aid' or 'foreign financing'. Full detail of the financing flows across sectors and between them with the rest of the world is one of the possible extensions of this Core account (and it is one of the four EPEA accounts in SEEA CF).

32. Alternative presentations of the Core account are possible, in particular with alternative breakdowns. For instance, the presentation below shows breakdowns by environmental protection purpose according to the CEPA classification. This presentation proposes, for simplicity, a three way split in wastewater management (CEPA 2), waste management (CEPA 3) and Other CEPA, since CEPA 2 and CEPA 3 are two of the most significant environmental services in many economies. Other users

may be interested in other categories, for instance expenditure on protection of biodiversity. Countries may want to consider splitting out other detail depending on the significance for national policy.

Core account: Expenditure for environmental protection purposes (alternative breakdown)

		Corporations			Government	Households	Rest of the world	TOTAL
		EP producers		non-EP producers				
		specialist producers	other producers					
1	Intermediate consumption on EP products (*)	2 900	400	1 000	4 000			8 300
2	*CEPA 2*	*700*	*100*	*250*	*1 000*			*2 050*
3	*CEPA 3*	*1 300*	*200*	*450*	*1 800*			*3 750*
4	*Other CEPA*	*900*	*100*	*300*	*1 200*			*2 500*
5	Final consumption on EP products				1 400	4 700		6 100
6	*CEPA 2*				*150*	*1 400*		*1 550*
7	*CEPA 3*				*800*	*2 000*		*2 800*
8	*Other CEPA*				*450*	*1 300*		*1 750*
9	Gross fixed capital formation on EP products	2 600	2 100	1 000	2 900			8 600
10	*CEPA 2*	*650*	*500*	*250*	*700*			*2 100*
11	*CEPA 3*	*1 200*	*900*	*450*	*1 300*			*3 850*
12	*Other CEPA*	*800*	*700*	*300*	*900*			*2 700*
13	**TOTAL use of EP products by resident units**	5 500	2 500	2 000	8 300	4 700		23 000
14	Gross fixed capital formation (on non-EP products) for EP production	1 900	1 500		1 000			4 400
15	Acquisition less disposals of non-financial, non-produced assets for EP production	50	NA		NA			50
16	Transfers not included in the total use of EP products						100	100
17	Transfers to the rest of the world (+)						800	800
18	*CEPA 2*						*200*	*200*
19	*CEPA 3*						*360*	*360*
20	*Other CEPA*						*240*	*240*
21	Transfers from the rest of the world (-)						700	700
22	*CEPA 2*						*200*	*200*
23	*CEPA 3*						*300*	*300*
24	*Other CEPA*						*200*	*200*
25	**TOTAL national environmental protection expenditure**	7 450	4 000	2 000	9 300	4 700	100	27 550
Supplementary item								
26	Intermediate consumption of EP products by EP producers	1 700	NA		805			2 505

(*) Item 1 is net of item 26 to avoid double-counting

33. All in all, the Core account provides information on the monetary resources the economy is dedicating to environmental protection and which institutional sectors are using these environmental products. It provides the basis for the following indicators:

- Level of national expenditure on environmental protection (NEEP) by sector, by type of product and by environmental function (CEPA).
- Distinction between current and capital expenditure, i.e. those directed to investment in future capacity to produce environmental products and those for current use. The information on investment patterns may be very important in the early stages of policy development in some cases.
- Information on environmental transfers with the rest of the world; capacity of the country to finance its environmental protection expenditure needs.

- Changes in trends (whenever NEEP is reported as time series).

These figures can be compared to SNA data on expenditure, value added, GDP and financing for the whole economy or parts of it. They can be used to calculate e.g. shares of total investment.

34. The Core account presented here represents a minimum for compilation. National compilers may consider additional breakdowns and extensions.

IV. Extensions and links

35. As explained above, the EPEA is only one of the environmental activity accounts in the SEEA CF. Links with other SEEA environmental activity accounts exist and can be exploited. Moreover a joint compilation system for several accounts can be envisaged, which would deliver economies of scale, efficiency gains and more robust estimates.

36. Links are strongest between the EPEA and the Environmental goods and services sector account (EGSS). Whereas EPEA addresses the expenditure (consumption, investment, financing), EGSS addresses the output, gross value added, growth, exports and other production-related variables (employment, consumption and investment needed for production). There are obvious overlaps and complementarity between EPEA and EGSS.

37. Indeed, there is an SNA accounting relation called product balance, applicable to any product and in particular to environmental protection products, which further cements the links between EPEA and EGSS. In a product balance, the amount of a product available for use within the economy must have been supplied either by domestic production or by imports. The same amount must be used for intermediate consumption, final consumption, capital formation or exports:

output + imports = intermediate consumption + final consumption + capital formation + exports (Equation 1)

Because of differences in SNA valuation rules in the left and right side of Equation 1, it is necessary to add taxes on products less subsidies on environmental products, and trade and transport margins, to the left-hand side.

38. This product balance allows e.g. deriving the expenditure variables needed for EPEA from supply variables (domestic output, imports) should they be known, for instance from EGSS.

intermediate consumption + final consumption + capital formation = output + imports – exports + items to adjust valuation (Equation 2)

39. This production approach can be advantageous if there is more information or more reliable estimates about production, imports and exports than about expenditure. This approach can be exploited to compile NEEP in EPEA, e.g. many handbooks recommended estimating key EPEA variables starting from output and adjusting for imports, exports and valuation as in equation 2. Indeed, two of the four interlinked EPEA accounts as presented in the SEEA CF follow this approach of calculating expenditure indirectly starting from production of environmental protection products.

40. Whenever EGSS and EPEA are combined or one is used to derive the other, it is essential to be aware that, while they are fully consistent, there are some differences between them which require adjustments. There are three main differences. First, the scope of EGSS is broader: whereas EPEA addresses environmental protection as defined in SEEA CF, EGSS covers environmental protection plus another category of environmental activities called resource management. These are activities to make more efficient use of natural resources. EGSS separates completely environmental protection from resource management, using different classifications (CEPA and CReMA, respectively). Secondly, EGSS and EPEA use different valuation principles, according to SNA, but reconciling them is possible. For instance output is valued at basis prices whereas consumption and gross fixed capital formation are valued at purchasers' prices. Thirdly, EGSS typically estimates cleaner products at their full value whereas EPEA does it at extra costs. Data should be adjusted accordingly.

41. It is also possible to estimate some parts of the economy (say some products or some sectors) using the left-hand side of equation 2 and other parts with the right-hand side part. The best framework to accomplish it is a supply and use table of environmental production products.

42. Whereas this approach in equation 2 can be used to derive EPEA expenditure variables indirectly from the production, it has drawbacks too. In particular it makes the EPEA framework more complex and obscure to newcomers, and for this reason it was not introduced in Sections II and III, and it is only proposed here as a possible extension. For details of this approach, refer to the bibliography.

43. Besides output, imports and exports, the EPEA can be extended to collect other variables about the producers of environmental protection products, e.g. employment, compensation of employees, consumption of fixed capital, net operating surplus, etc. These variables can also be compiled in EGSS and afterwards inserted in the EPEA. The EPEA may also be extended with environmental protection transfers across the institutional sectors (corporations, government, households), breakdowns between current and capital transfers, etc.

44. Another SEEA environmental activity account related to EPEA is the Resource management expenditure account (ReMEA). This account is the twin sister of EPEA for resource management. It studies demand and financing of resource management. Most variables, concepts and definitions are the same as EPEA but it uses a classification of resource management (CReMA) instead of environmental protection (CEPA). For historical reasons and availability of data sources, ReMEA is far less advanced than EPEA even if they are conceptually similar.

45. EPEA, together with EGSS and ReMEA, can be used to set up supply and use tables of environmental products. A supply and use table is a set of 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 categories (detail by CEPA-CReMA and are more suitable for detail by type of environmental product), which instead the production and expenditure accounts do not have.

46. A supply and use table for environmental products is shown below. For the purpose of illustration, this table includes environmental protection products and resource management products, but EPEA

is only concerned with environmental protection. The totals in the supply table and use table are identical for each product or group of products. Colors illustrate which account may be the basis for the table data, but it can be different e.g. if EGSS or EPEA include additional variables.

Supply table for environmental products

SUPPLY	Output at basic prices						Total output basic prices	Imports	Taxes less subsides on enviroment al products	Trade and transport margins	Total supply purchasers' prices
	ISIC A	ISIC B	ISIC C	ISIC D-E	ISIC F	ISIC G-U					
CEPA 2		500	900	2 900	900		5 200	130	300		5 630
Specific products		*500*	*200*	*2 500*	*130*		*3 330*	*100*	*200*		*3 630*
Cleaner products			*700*	*400*	*770*		*1 870*	*30*	*100*		*2 000*
CEPA 3		800	2 800	6 100	2 700		12 400	1 700	600		14 700
Specific products		*400*	*400*	*5 500*	*300*		*6 600*	*1 400*	*500*		*8 500*
Cleaner products		*400*	*2 400*	*600*	*2 400*		*5 800*	*300*	*100*		*6 200*
other CEPAs	100	300	300	2 600	400	450	4 150	70	200	50	4 470
Specific products	*100*	*100*	*100*	*2 000*	*100*	*100*	*2 500*	*50*	*150*		*2 700*
Cleaner products		*200*	*200*	*600*	*300*	*350*	*1 650*	*20*	*50*	*50*	*1 770*
TOTAL environmental protection	100	1 600	4 000	11 600	4 000	450	21 750	1 900	1 100	50	24 800
CReMA 13A	50	250	2200	1400	1900	1200	7 000	600	350		7 950
Specific products	*50*	*150*	*700*	*800*	*300*	*1200*	*3 200*	*500*	*300*		*4 000*
Resource-efficient products		*100*	*1500*	*600*	*1600*		*3 800*	*100*	*50*		*3 950*
CReMA 13B		200	2300	500	1000	2100	6 100	500	300		6 900
Specific products		*50*	*300*	*100*	*200*	*500*	*1 150*	*400*	*250*		*1 800*
Resource-efficient products		*150*	*2000*	*400*	*800*	*1600*	*4 950*	*100*	*50*		*5 100*
Other CReMAs	100	600	1400	700	600	1000	4 400	400	200	50	5 050
Specific products	*50*	*400*	*1000*	*500*	*400*	*700*	*3 050*	*300*	*150*		*3 500*
Resource-efficient products	*50*	*200*	*400*	*200*	*200*	*300*	*1 350*	*100*	*50*	*50*	*1 550*
TOTAL resource management	150	1050	5900	2600	3500	4300	17 500	1 500	850	50	19 900
TOTAL	250	2650	9900	14200	7500	4750	39 250	3 400	1 950	100	44 700

= EGSS-based = based on ESST or EPEA+ReMEA or EGSS

= via balancing of supply-use of products

Use table for environmental products

USE	Intermediate consumption (by corp., government, households) (breakdowns by industry)						Total intermediate consumption	Final consumption		Gross fixed capital formation	Exports	Total use at purchases' prices
	ISIC A	ISIC B	ISIC C	ISIC D-E	ISIC F	ISIC G-U		Government	Households			
CEPA 2		200	100	1500	200		2 000	150	1 400	2 000	80	5 630
Specific products		*200*	*100*	*1500*	*200*		*2 000*	*150*	*1 400*		*80*	*3 630*
Cleaner products										*2 000*		*2 000*
CEPA 3		200	200	4100	200		4 700	800	2 000	5 500	1 700	14 700
Specific products		*200*	*200*	*3700*	*150*		*4 250*	*750*	*2 000*		*1 500*	*8 500*
Cleaner products				*400*	*50*		*450*	*50*		*5 500*	*200*	*6 200*
Other CEPAs	50	150	150	800	200	250	1 600	450	1 300	1 100	20	4 470
Specific products	*50*	*50*	*50*	*600*	*50*	*50*	*850*	*350*	*750*	*750*		*2 700*
Cleaner products		*100*	*100*	*200*	*150*	*200*	*750*	*100*	*550*	*350*	*20*	*1 770*
TOTAL environmental protectio	50	550	450	6400	600	250	8 300	1 400	4 700	8 600	1 800	24 800
CReMA 13A	20	130	150	800	100	400	1 600	2 000	100	4 150	100	7 950
Specific products	*20*	*130*	*150*	*600*	*100*	*400*	*1 400*	*1 800*	*100*	*600*	*100*	*4 000*
Resource-efficient products				*200*			*200*	*200*		*3 550*		*3 950*
CReMA 13B		50	1050	350	600	1150	3 200	1 500	250	1 300	650	6 900
Specific products		*10*	*250*	*80*	*60*	*350*	*750*	*600*	*150*		*300*	*1 800*
Resource-efficient products		*40*	*800*	*270*	*540*	*800*	*2 450*	*900*	*100*	*1 300*	*350*	*5 100*
Other CReMAs	50	150	250	350	150	350	1 300	800	150	1 450	1 350	5 050
Specific products	*20*	*100*	*150*	*200*	*100*	*250*	*820*	*600*	*100*	*1 080*	*900*	*3 500*
Resource-efficient products	*30*	*50*	*100*	*150*	*50*	*100*	*480*	*200*	*50*	*370*	*450*	*1 550*
TOTAL resource management	70	330	1450	1500	850	1900	6 100	4 300	500	6 900	2 100	19 900
TOTAL	120	880	1900	7900	1450	2150	14 400	5 700	5 200	15 500	3 900	44 700

= EPEA-based = ReMEA-based

47. Another activity account related to EPEA is the Environmental subsidies and similar transfers account (ESST). This account studies the subsidies on environmental products and other transfers related to environmental products in more detail than in EPEA and ReMEA. ESST covers fewer variables but in more detail than EPEA, in particular as regards transactions between the sectors in the country (government, corporations, households) rather than only those to/from the rest of the world.

48. Finally, expenditure for environmental protection purposes from EPEA can also be useful to complete physical accounts such as the water accounts, energy accounts and air emissions accounts.

V. Combined Presentation and Aggregates

49. This section presents two accounts that can be produced as combined presentations of the EPEA with other SEEA activity accounts, in particular EGSS and ESST. As will be seen, these accounts are an extension of the Core account presented in section III. These combined presentations can be used to derive indicators and to put in relation with SNA aggregates for the whole economy.

50. The fist combined presentation is an environmental protection production account. It presents information on the output of all environmental protection goods and services 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.

51. The bottom part of the account (rows 11-20) reports output, imports and exports of environmental protection products, i.e. the information from the right-hand side of equation 2. This information is organised in such a way as to prepare the calculation of the corresponding expenditure for the EPEA and the final calculation of NEEP. In particular, row 15 explicitly deducts the intermediate consumption of EP products for the production of other EP products, to avoid a double-counting of those products in the expenditure side, as stated in paragraph 26. Row 22 adjusts the valuation of cleaner products, as output, imports and exports in rows 11-20 value them at full costs whereas for the NEEP they are sought at extra costs.

52. The top part of the account (rows 1-10) reports relevant variables concerning the producers of environmental protection products which were not in the Core account. In particular the sum of intermediate consumption (row 1) and the value added (row 2) equals the total output (row 11). The remaining top part of the account reports how income is generated by the producers of environmental protection and the gross value added is distributed to the production factors as income (note how the sum of rows 6-10 is row 5). All these variables follow the definitions of SNA, and can thus be compared with the corresponding variables from SNA for the whole economy or for each sector. Finally, row 24 reports another variable about the producer of EP products, namely employment. Contrarily to all the other variables in the EPEA, which are measured in currency units, employment is measured in jobs, full-time equivalents or persons employed.

Combined presentation of a production account based on EGSS, EPEA and ESST

		Corporations			Government	Households	Rest of the world	TOTAL
		EP producers		non-EP producers				
		specialist producers	other producers					
1	Intermediate consumption of producers of EP	4 100	1 950		2 950			9 000
5	Value added of producers of EP	9 950	850		5 550			16 350
6	Compensation of employees	3 750	250		2 000			6 000
7	(Other) Taxes on production (+)	450	60		1 700			2 210
8	(Other) Subsidies on production (-)	300	5		1 200			1 505
9	Consumption of fixed capital	1 500	100		400			2 000
10	Net operating surplus	4 550	445		2 650			7 645
11	**TOTAL output of producers of EP (basic prices)**	14 050	2 800		8 500			25 350
12	market output	13 500	2 300		4 500			20 300
13	non-market output	0	0		4 000			4 000
14	own account output	550	500		0			1 050
15	Intermediate consumption of EP products (-)	1 700	NA		800			2 500
16	VAT and other taxes on EP products (+)	600	100		2 100			2 800
17	Subsides on EP products (-)	500	90		1 510			2 100
18	Trade and transport margins	30	10		10			50
19	Imports of EP goods and services (+)						1 900	1 900
20	Exports of EP goods and services (-)						1 800	1 800
21	**TOTAL environmental output available for uses by resident units (at purchasers' prices)**	12 480	2 820		8 300		100	23 700
22	Correction for valuation of cleaner and resource-efficient products at extra costs (-)	400	90		200		10	700
23	**TOTAL environmental output available for uses by resident units (at purchasers' prices; cleaner products valued at extra costs)**	12 080	2 730		8 100		90	23 000
	Supplementary item							
24	Employment of producers of EP (jobs or full-time equivalents)	270 000	30 000		100 000			400 000

= EGSS-based
= EPEA-based
= not applicable
= based on EPEA or EGSS or ESST
= via balancing of supply-use of products

53. The second combined presentation is an expenditure account. This is an extension of the Core account for the EPEA shown in Section III. The top part of the account (rows 1-10) reports the expenditure on environmental protection products by resident units. This is identical to the Core account in Section III and it shows the direct link with the production account as total national use of environmental products (23 000, row 10) equals total environmental protection output at purchasers' prices available for national uses (row 23 in the production account). However identify this does not hold for the sectors, because in the production account they represent how much each sector produced whereas in the expenditure account they represent how much they spent, which are different concepts. Similarly, the intermediate consumption by producers of EP products (production account, row 1) is a different concept that the intermediate consumption in EP products (expenditure account, row 1).

54. The middle part of the expenditure account (rows 11-16) is identical to the Core account from Section III and needs no further explanation. The bottom part of the expenditure account (rows 17-20) shows more detail on the financing part of the expenditure than the Core account. This additional information is mostly based on ESST, although it may also be based on an extension of EPEA. They

are all flows between the sectors of the economy, so that they cancel out in the national total (total of each row is zero) and with the rest of the world. Correspondingly, the national total of rows 16 and 22 are identical, but they distribution by sector differs: NEEP in row 16 reports who spends on environmental protection whereas row 22 reports who finances the expenditure.

Combined presentation of an expenditure account based on EGSS, EPEA and ESST

		Corporations			Government	Households	Rest of the world	TOTAL
		EP producers		non-EP producers				
		specialist producers	other producers					
1	Intermediate consumption on EP products	2 900	400	1 000	4 000			8 300
2	*specific environmental protection products*	*2 600*	*300*	*700*	*1 100*			*4 700*
3	*cleaner products*	*300*	*100*	*300*	*900*			*1 600*
4	Final consumption on EP products				1 400	4 700		6 100
5	*specific environmental protection products*				*1 250*	*4 150*		*5 400*
6	*cleaner products*				*150*	*550*		*700*
7	Gross fixed capital formation on EP products	2 600	2 100	1 000	2 900			8 600
8	*specific environmental protection products*	*1 800*	*1 400*	*650*	*1 900*			*5 750*
9	*cleaner products*	*800*	*700*	*350*	*1 000*			*2 850*
10	**TOTAL use of EP products by resident units**	5 500	2 500	2 000	8 300	4 700		23 000
11	Gross fixed capital formation (on non-EP products) for EP production	1 900	1 000	500	1 000			4 400
12	Acquisition less disposals of non-financial, non-produced assets for EP production	50	NA	NA	NA			50
13	Transfers not included in the total use of EP products						100	100
14	Transfers to the rest of the world (+)						800	800
15	Transfers from the rest of the world (-)						700	700
16	**TOTAL national environmental protection expenditure**	7 450	3 500	2 500	9 300	4 700	100	27 550
17	Environmental subsidies on production (D39)	-10	-5	0	15			0
18	Social contributions and benefits (D6)	-400	-40	-20	1 220	-760		0
19	Other current transfers (D7)	50	10	5	5	0	-70	0
20	Capital transfers (D9)	15	5	NA	10	0	-30	0
21	Earmarked taxes (D2)	20	10	0	-30	0		0
22	**TOTAL national environmental protection expenditure**	7 085	3 460	2 485	10 580	3 940	0	27 550

= EGSS-based = EPEA-based = ESST-based

= not applicable = based on EPEA or EGSS or ESST

VI. Compilation

55. The compilation of SEEA accounts should be founded on the GSBPM as outlined in the first note in this series "Statistical Production Processes for Implementation of the SEEA-Central Framework".

Overarching Management Functions							
1 Specify Needs	**2 Design**	**3 Build**	**4 Collect**	**5 Process**	**6 Analyze**	**7 Disseminate**	**8 Evaluate**

Specify Needs, Design & Build

56. It is often the case when building accounts (SEEA or SNA for example) that one of the goals is to use existing data sources as much as possible. In such a case, the Specify Needs, Design and Build phases will often need to be undertaken simultaneously and iteratively, as one evaluates the capacity of existing data sets to meet needs relative to the potential costs of initiating new data development.

57. Since the role of protecting the environment is organized differently across nations, the first step in developing an EPEA is to document these responsibilities in one's country. The organizations with these responsibilities will be important in determining the data needs but may also have expertise and existing data sources that can support the development of the accounts.

58. Consult with policy makers, stakeholders and potential data providers on the environmental protection activities of interest for the country. Setting out the specific activities that would be of interest to the information needs of the country should be done at this stage. This will provide a basis to examine the adequacy of the existing data and assess where additional information may be required.

59. It will be important to find the appropriate balance between the detail sought by policy makers and analysts and the capacity of the statistical infrastructure to deliver sufficiently robust estimates particular in the early stages of development. When first setting up an EPEA account, care should be taken to not be overly ambitious. It is advisable to focus on major producers and products in the initial development and then improve the estimates as experience with the account is acquired. For EPEA this may be starting with the Government sector and the specialist producers (finding or collecting data for non-specialist producers with only small production values may prove very costly). However it is also important to recognize the demands for detailed estimates so that the development of data sources and systems can anticipate eventual improvements in these dimensions.

60. These initial steps may not need to be undertaken for each data cycle but should be revisited periodically in conjunction with longer term planning cycles.

61. Part of the design phase is making the scope of environmental protection operational. The SEEA CF definition of environmental protection, introduced in Section II, emphasises the purpose of the activities and actions. Experience over the years has shown that several interpretations of the concept of 'environmental' and of the determination of the purpose may exist. Therefore, the national compilers must identify environmental protection activities, products and producers in classifications, lists and business registers. One starting point is identifying specific products and specialist producers in available classifications, such as (national versions of) CPC and ISIC. Using lists created for other environmental activity accounts, such as EGSS, is also an option and it reinforces coherence between accounts. This work can also be facilitated and coordinated at international level, as to produce lists that can be shared across countries; however some room for adaptation to national circumstances is normally required. Because there is considerable technological progress in product development in the environmental domain, it is important to update product and activity lists on a regular basis.

62. Next is to identify potential data sources and assess their suitability for estimating the desired variables for the full range of EPEA activities. They can e.g. be found in the national accounts or the

economic statistics feeding into the accounts, both the production account, but also government financing are important sources. Consider links to other environmental data initiatives planned or underway that could be potential data sources or provide guidance in classifying or identifying environmental protection expenditures (EGSS for example).

63. Some activities and products such as operation of the waste water treatment system or waste management and associate services (ISIC 37-39) will be totally within scope for EPEA. However, since these activities are often the responsibility of local governments, either directly delivered or contracted out to the private sector, there may be a wide variety of practices with regard to some aspects of these environmental protection activities. For example, financing of such facilities can vary widely across jurisdictions.

64. Identifying specialist producers units in the business registry should be attempted. It may also be useful to identify producers with secondary products that make a significant contribution to environmental protection. Canada, for example, provides the capacity to record program specific attributes that are linked to entities on the business register for targeted data collection activities.

65. To the extent that specialist producers engage in no significant non-environmental protection activities, all of their expenditure on assets, including the purchase of fixed assets to undertake the production and the acquisition less disposal of non-produced, non-financial assets, particularly land, is within scope of environmental protection expenditure. Instead the inclusion of all expenditure on capital formation does not apply to non-specialist or own-account producers; for them appropriate estimates of the shares for environmental protection are necessary.

66. Administrative data on environmental protection activities and regulation may also provide sources for some aspect of environmental protection. Business associations may be a source of producers of environmental services. Increasingly individual businesses and industry associations are highlighting members activities related to environmental activities and these reports may provide ratios such as portions of activities or full-time equivalent activity that can be used to estimate the associated values. Contacting the association may provide access to lists of members or the associations may be prepared to use its own expert knowledge of sector activities to identify major producers and products relevant for the economy. They also often have knowledge of patterns of international trade and also which activities or products are not significant for the particular economy.

67. Detailed national accounts estimates and the data sets that support these should be examined for their potential to provide EPEA data. However, in some cases the detail may not be sufficient to identify environmental protection activities, in particular for market producers (corporations). One case where detailed data may exist is in government financial data given the growing interest and focus on these activities by many governments.

68. The main source of data for the Government sector is national accounts − general government expenditure by function (COFOG) and in particular items classified in COFOG 5. Analysis of financial budgets and accounts analysis is useful for detailing environmental protection expenditure activities already recorded in a more aggregated way under COFOG statistics (e.g. to split up COFOG 5.3). The calculation of more detailed data for some variables may require appropriate estimation techniques, for example in the case of consumption of fixed capital which could be

estimated from data on investments or from data available from national accounts using appropriate ratios.

69. One of the functions (division 05) of the COFOG is environmental protection. The breakdown of environmental protection is based upon the Classification of Environmental Protection Activities (CEPA). The table below shows the relationship between the groups of the COFOG's division 05, CEPA classes and gives some indications on the corresponding ISIC classes (even though not 100% of the indicated ISICs correspond to the respective COFOG / CEPA: there cannot be a perfect match between COFOG / CEPA (purpose) and ISIC (product characteristics, processes, technology) classifications.

COFOG 05 (Environmental Protection)	CEPA 2000	ISIC
05.1 Waste management	3. Waste management	381; 382; 39; 8129
05.2 Waste water management	2. Wastewater management	37
05.3 Pollution abatement	1. Protection of ambient air and climate	39
	4. Protection and remediation of soil, groundwater and surface water	39
	5. Noise and vibration abatement	4329; 7120
	7. Protection against radiation	3812; 3822
05.4 Protection of biodiversity and landscape	6. Protection of biodiversity and landscapes	9104
05.5 R&D environmental protection	8. Research and development	72
05.6 Environmental protection n.e.c.	9. Other environmental protection activities	8412; 9499

70. Environmental data sets used for other SEEA activity accounts may provide information on production of Environmental goods and services accounts (see section IV). Also, economic data programs may provide some data of use for the identification of these activities.

71. Finally, adding questions to existing surveys or developing new surveys may be an option. However, care should be taken as the distribution of environmental expenditures may be distributed widely and not well correlated with other activity thus making surveying challenging. This may be particularly true for capital investment where expenditures can be widely dispersed with timing tied to the more general investment decisions of the firm or highly concentrated in response to government initiatives.

72. At this point, if sufficient basic data is not available to produce estimates for one or more important production of environmental goods or services, it may be necessary to initiate a project to establish a new source of data. This may mean that the development of the sector splits into two paths: one that can provide partial coverage with existing data and one where development would have to await the availability of basic data.

73. In some cases where partial data exist but there are some important data gaps, it may be a good idea to construct a preliminary set of estimates based on related flows or modelling to fill the gaps. This could be done to aid in the development of the missing basic data.

74. In the case where basic data must be developed, it is recommended that a separate project be initiated to develop the necessary data. This project should follow the GSBPM steps and generic principle as set out in the first note in this Technical Note series. Depending on the organization of responsibilities within the statistical infrastructure of the country, this step may involve additional agencies or sectors of the NSI.

Collect

75. Secure access to data, associated metadata and the rights to disseminate the estimated variables that are derived from that data. Where needed, obtain access to expertise in organizations from which data is being sought to assist with analysis and/or training. The terms of access under current institutional arrangements are key. The terms should support cooperative working arrangements and the release of data with sufficient detail to address the policy issues important for the country. This step can take considerable effort and time in cases where institutional arrangements are not yet established. It will be important for all agencies involved to clearly appreciate the mandate of the other agencies and associated constraints.

76. Given that data may be acquired from a number of institutions or agencies, it may be beneficial to establish standard data transfer protocols in particular for data collected and processed frequently.

77. Databases for the basic data and the associated accounts must be established. As the SEEA links to the SNA, existing database structures and associated processing systems may be a good source for this development. These databases should also allow easy linking with standard data sets for related domains so that verification and confrontation of data is facilitated. It is also important to collect metadata with each period or at least verify that it has not changed so as to be aware of any changes to classification, definitions, etc.

78. Import data and process data including applying concordances that may be required between the classifications used in the imported data and the classifications to be used in the estimates. Identification at the entity level may also allow the use of micro data linking techniques. This may allow the linking of data across survey and administrative data sets to provide new detailed data categories.

Process

79. Some adjustments will be required to add components. In this sense, it is important to closely examine the metadata associated with the data sources to assess coherence between data sources. Assess whether or not the definitions conform to and/or support those set out for the required activities in the design stage. If not, is the shortcoming important or can it be overcome with estimates based on alternate sources? Also, key at this stage is to clearly ascertain the classification, conceptual and coverage differences across the various data sets to be used as basic inputs.

80. Decide if for some elements there are better alternatives that the demand approach. For households and government, a demand side approach may be the best one, i.e. measuring their expenditure. Instead, the activities of specialist producers as defined for EPEA may be best approached from the supply side given their entire output is part of EPEA production (see sections IV and V). Caution must be taken not to double count expenditures in the case of specialist producers.

81. Prepare estimates, including the estimation of data for any data gaps. Many of the efforts to estimate EPEA have been based on using proxies from other data sources to estimate ratios that are applied to national accounts information. Given the use of proxies to estimate some data and the varying

quality and coverage of these, it is likely that different methods will need to be considered for each industry/sector of the economy.

82. Once all required variables have been derived, they should be put into a common format and confronted with existing data from other sources such as the SNA, business association outputs or measures from other departments or agencies. In the case of EPEA, this is particularly important that the data on financing of the expenditures be confronted with the data on expenditure to assure reasonableness.

Analyse

83. Analyse tables and graphic representations including undertaking an analysis of time series where possible and recognising the likely need for multiple iterations of this and the previous step. Data quality should be assessed and documented at this stage.

84. The steps in the above three paragraphs are the core activities in building the estimates and will be repeated in cycle during each production period. This allows the strength of the accounting approach to be used to confront the various data sources and check for consistency and reasonableness in comparison to other datasets such as the related national accounts values.

85. The first time accounts are estimated for a new program, particular attention needs to be made with regard to adjustments required to the source data to ensure the methods used are appropriate and sound. Given that proxy data and ratios are likely to be used for these estimates, the reasonableness of the initial estimates needs to be thoroughly assessed.

86. It is recommended that in cases where significant basic data come from other agencies, the staff of those agencies be asked to participate in the analysis of the estimates. These experts often have in depth knowledge that can allow the identification and resolution of inconsistencies.

Disseminate

87. Disseminate estimates, including material to assist interpretation (e.g. indicators, methodological notes and statements of data quality)

88. The dissemination of data should always be accompanied by sufficient documentation and metadata to allow users to fully understand the information being disseminated. This is particularly important for the initial dissemination of a new program of data where one might want to identify the initial data as ‘experimental’ or ‘preliminary’ and make it clear that user input is being sought in order to improve future releases.

Evaluate

89. Archive data and related methodological and other documentation. Review estimates, data sources, methods and systems, including actively seeking user feedback.

90. These last two steps are very important for all statistical programs but when initiating a new program of data, seeking user feedback is crucial. This in turn depends on the existence of good documentation on the methods and systems so as to properly inform users and assess their feedback.

VII. References

- SEEA-Central Framework: https://seea.un.org/sites/seea.un.org/files/seea_cf_final_en.pdf
- SNA 2008: System of National Accounts https://unstats.un.org/unsd/nationalaccount/sna2008.asp
- Integrated framework https://seea.un.org/sites/seea.un.org/files/briefing_note_for_unceea_-_integrated_framework_sv_002.pdf and https://seea.un.org/sites/seea.un.org/files/seea_paper_integrated_framework_estat_v5.pdf

Handbooks:

- Eurostat Environmental Protection Expenditure Accounts, edition 2017
- Environmental expenditure statistics: General Government and Specialised Producers data collection handbook, 2007
- Environmental expenditure statistics: Industry data collection handbook, 2005
- OECD/Eurostat Environmental Protection Expenditure and Revenues Joint Questionnaire/SERIEE Environmental Protection Expenditure Account: Conversion Guidelines, 2005
- SERIEE — Environmental protection expenditure accounts - Compilation Guide, 2002
- SERIEE — European System for the collection of economic information on the environment, 1994 version

Examples of disseminations of statistics, Eurostat:

- Statistics Explained: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Environmental_protection_expenditure_accounts
- https://ec.europa.eu/eurostat/web/environment/environmental-protection
- https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20220610-1

Examples of dissemination of statistics, country level:

- Central statistical office Poland: https://stat.gov.pl/en/topics/environment-energy/environment/economic-aspects-of-environmental-protection-2021,4,2.html (In Polish and English)
- Statistics Sweden: https://www.scb.se/en/finding-statistics/statistics-by-subject-area/environment/environmental-accounts-and-sustainable-development/environmental-protection-expenditure/ (in Swedish and English)
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