

Environmental protection expenditure accounts

HANDBOOK

2017 edition



**Environmental protection
expenditure accounts** | 2017 edition
Handbook

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Preface

Environmental protection expenditure statistics quantify the resources devoted to the environmental protection by resident economic units. This information supports understanding the response of society to the challenge of environmental degradation and depletion of natural resources, and the potential for economic activity to be based on environmentally friendly activities.

Environmental protection expenditure statistics are the longest standing environmental monetary statistics in Europe as methodology and a data collection exist since the 90s. They contribute directly or indirectly to the Union's policy priorities on environmental protection, resource management and green growth by providing important information on the production and the use of environmental protection services.

The environmental protection expenditure accounts (EPEA) are a new advancement in this direction. EPEA are one of the European environmental-economic accounts as established in Regulation (EU) No 691/2011 and compiled in agreement with the international standards of the System of Environmental-Economic Accounting, Central Framework 2012. They are also coherent with the international United Nations System of National Accounts and its European version, the European System of Accounts.

EPEA measure the economic resources devoted to 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. This assesses the financial commitment of an economy to environmental protection, evaluates how the environmental protection costs influence international competitiveness, assesses the application of the polluter pays principle and the cost-effectiveness of environmental control mechanisms.

This handbook is meant as a reference tool for data producers as regards data collection, compilation and reporting of EPEA to Eurostat. It updates the previous manuals and handbooks published by Eurostat on Environmental protection expenditure accounts.

This handbook was written by Gérard Gie (In Numeri, France), Gerald Weber (Eurostat) and Arturo de la Fuente (Eurostat) with numerous contributions from the members of the Eurostat Working Group on monetary environmental statistics and accounts. We warmly thank all the colleagues that contributed to make this publication possible.

Anton Steurer

Head of Unit E2

Environmental statistics and accounts; sustainable development

List of abbreviations and acronyms

BoP:	Balance of Payments
CEPA:	Classification of Environmental Protection Activities
CN:	Combined Nomenclature
CN8:	Combined Nomenclature
CFC:	Consumption of Fixed Capital
COFOG:	Classification of the Functions of Government
CPA:	Statistical Classification of Products by Activity
CPC:	Central Product Classification
CReMA:	Classification of Resource Management Activities
DG:	Directorate General
EGSS:	Environmental Goods and Services Sector
EBOPS:	Extended Balance of Payments Services Classification
EP:	Environmental Protection
EPE:	Environmental Protection Expenditure
EPEA:	Environmental Protection Expenditure Account
EPER:	Environmental Protection Expenditure and Revenues
ESA 2010:	European System of Accounts (2010)
ESS:	European Statistical System
ESST:	Environmental Subsidies and Similar Transfers
EU:	European Union
FTE:	Full-time equivalents
FTS:	Financial Transparency System
GDP:	Gross Domestic Product
GFCF:	Gross Fixed Capital Formation
GG:	General Government
HS:	Harmonised Commodity Description and Coding System
ISIC:	International Standard Industrial Classification
KAU:	Kind of Activity Unit
LFS:	Labour Force Survey
Local KAU:	Local Kind of Activity Unit (establishment)
NA:	National Accounts
NACE:	Statistical Classification of Economic Activities in the European Community
NP:	Acquisitions less disposals of non-produced non-financial assets
NPISH:	Non-profit institutions serving households
OECD:	Organisation for Economic Cooperation and Development
PIM:	Perpetual inventory method
PRODCOM:	PRODucts of the European COMMunity

R&D: Research and Development

RM: Resource Management

SBS: Structural Business Statistics

SEEA-CF: System of Environmental-Economic Accounting –Central Framework

SERIEE: European System for the Collection of Economic Information on the Environment

SNA: System of National Accounts

SUT: Supply and Use Tables

UN: United Nations

VAT: Value added tax

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1

Introduction

Policy context

Sustainable development is one of the founding objectives of the European Union. The Treaty on European Union states in Article 3(3), *inter alia*, that the Union ‘shall work for the sustainable development of Europe based on balanced economic growth and price stability, a highly competitive social market economy, aiming at full employment and social progress, and a high level of protection and improvement of the quality of the environment’.

Environmental protection expenditure consists of the economic resources devoted to all activities and actions which have as their main purpose the prevention, reduction and elimination of pollution and of any other degradation of the environment. Those activities and actions include all measures taken in order to restore the environment after it has been degraded. Measuring the financial commitment of an economy to environmental protection assists to evaluate how the environmental protection costs influence international competitiveness, to assess the application of the polluter pays principle, and the cost-effectiveness of environmental control mechanisms. Monetary data may also be used to examine to what extent different economic agents internalize the actual costs of environmental protection in their decision-making.

Environmental protection activities originally regarded the demand of basic environmental protection services, such as sewerage and waste collection and elimination. With European citizens becoming increasingly aware of environmental problems, the European Union adopted a series of Directives, strategies and programmes (Waste Framework Directive⁽¹⁾, Water Framework Directive⁽²⁾, EU Biodiversity Strategy to 2020⁽³⁾, Clean Air Policy Package, etc.) designed to move Europe towards a sustainable growth based in particular on environmental protection activities. Environmental protection activities gradually shifted from collection and treatment of pollution to policies of pollution prevention, an increasing internalization of corporations’ environmental protection activities through industrial process modifications coinciding with a growing demand of less polluting products. Presently, environmental protection activities are shifting towards fighting climate change, reduction of air pollution and preservation of the biodiversity.

The 7th General Union environment action programme ‘[Living well, within the limits of our planet](#)’ called for a more informed basis for developing and implementing environment and climate policies, including measuring the costs and benefits of action and the costs of inaction. The 7EAP notes the importance of an information system to trace biodiversity and climate-related expenditure and asks to continue work to develop indicators for monitoring economic progress and which complement and go beyond gross domestic product (GDP).

As environmental protection activities became more and more important in all sectors of the economy, the development of statistical and accounting frameworks capable of measuring the countries’ efforts in environmental protection, its costs and the economic activities it drives was initiated in the early 90’s. This

⁽¹⁾ See [Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directive](#)

⁽²⁾ See [Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy](#)

⁽³⁾ See COM(2011) 244 final: Communication from the Commission to the European parliament, the Council, the Economic and Social Committee and the Committee of the Regions: [Our life insurance, our natural capital](#)

led to the definition of a statistical and accounting framework (SERIEE ⁽⁴⁾) and to the launch of an international reporting system (the OECD/Eurostat Joint Questionnaire on environmental protection expenditures and revenues⁽⁵⁾). A classification of environmental protection activities (CEPA) was adopted as an international standard at the same time.⁽⁶⁾

Existing conceptual frameworks

EPEA are part of the environmental accounts. Environmental accounts are a multipurpose data system encompassing a conceptual framework and tables which describe the interrelations between the economy and the environment in a way that is consistent with the national accounts. Environmental accounts provide information related to a broad spectrum of environmental and economic issues including, in particular, the assessment of trends in the use of natural resources, the extent of emissions and discharges to the environment resulting from economic activity, and the extent of economic activity undertaken for environmental purposes.

Environmental accounts are addressed in chapter 29 “Satellite accounts and other extensions” of the System of National Accounts (SNA 2008, United Nations et al., 2009) and in chapter 22 of the European System of Accounts (ESA 2010, Eurostat, 2013).

The System of Environmental-Economic Accounting 2012 - Central Framework, the SEEA-CF 2012 (United Nations et al., 2014)⁽⁷⁾ is a framework for environmental-economic accounts, covering both physical and monetary accounts. The SEEA-CF is the internationally agreed standard for concepts, definitions, classifications, accounting rules and tables for producing accounts on the environment and its relationship with the economy. The SEEA-CF follows an accounting structure similar to the SNA and uses concepts, definitions and classifications consistent with the SNA in order to facilitate the integration of environmental and economic statistics. This allows comparing the aggregates of the environmental-economic accounts with those of national accounts.

Important monetary environmental accounts are Environmental Protection Expenditure Accounts (EPEA), Resource Management Expenditure Accounts (ReMEA), Environmental Goods and Services Sector (EGSS) accounts, Environmental Subsidies and Similar Transfers (ESST) and Environmental Taxes.

The SEEA-CF in its section 4.3 titled “Environmental activity accounts and statistics” states that the purpose of environmental protection expenditure accounts is to enable identification and measurement of society’s response to environmental concerns through the supply of and demand for environmental protection services and through the production and consumption behaviour aimed at preventing environmental degradation.

The purpose of the EPEA is, within a framework consistent with the European System of Integrated Economic Accounts (ESA), to come up with answers to the following questions:

- how much does a nation spend on environmental protection and what form does this expenditure take? (determination of the national expenditure on environmental protection)
- how and by which units is this expenditure financed? (analysis of the financing of national expenditure)
- which economic activities are induced by environmental protection? (analysis of the output of environmental protection services).

With this information, EPEA can also be the basis for deriving indicators for key areas, such as the expenditure on pollution prevention and abatement, the contribution made by environmental protection activities to the economy, and the shift to pollution-preventing technologies.

Linking expenditure on environmental protection to physical data, such as the amount of waste treated, the extent of protected areas and the number of patents for environmental protection products may also support additional analyses.

⁽⁴⁾ See the [European System for the Collection of economic information on the environment](#).

⁽⁵⁾ See [JQ EPER SERIEE EPEA conversion guidelines](#)

⁽⁶⁾ See on RAMON the Eurostat server of classifications [CEPA](#)

⁽⁷⁾ See [System of Environmental-Economic Accounting 2012 – Central Framework](#)

European strategy for environmental accounts and legal basis

In order to respond to the growing needs of environmental-economic information in Europe, a multi-year European Strategy on Environmental Accounts (ESEA) was established. The first ESEA dates from 2003 and covered the period 2003-2007. This strategy was subsequently extended and improved. The present ESEA for the period 2014-2018 was agreed by the European Statistical System Committee in its 21st meeting held in Luxembourg on 14th and 15th May 2014.

The progress achieved with ESEA led to the adoption in 2011 of a legal basis (Regulation (EU) No 691/2011⁽⁸⁾) for a common framework for the collection, compilation, transmission and evaluation of European environmental-economic accounts. The Regulation originally covered three modules: environmental taxes, economy wide material flow accounts and air emissions accounts.

Regulation (EU) No 691/2011 also asked the Commission to draw up pilot study programmes to test the feasibility of the introduction of new environmental-economic accounts modules. By 2014 the experience had matured enough that the European Parliament and the Council agreed to include three new accounts – Environmental Goods and Services Sector accounts, Environmental Protection Expenditure Accounts and Physical Energy Flow Accounts in the legal basis (Regulation (EU) No 538/2014⁽⁹⁾ amending Regulation (EU) No 691/2011).

Annex IV of the Regulation is devoted to the EPEA. It sets up the transmission of data from Member States to Eurostat. It includes mandatory reporting of output, consumption, imports and exports of environmental protection services, gross fixed capital formation and acquisitions less disposals of non-produced non-financial assets for the production of environmental protection services, and transfers for environmental protection cross classified by institutional sectors and classes of the Classification of Environmental Protection Activities (CEPA). Besides the EPEA characteristics included in Annex IV, which are mandatory, there are other EPEA characteristics for voluntary reporting, in particular characteristics related to production costs of environmental protection services.

Purpose and structure of the handbook

This handbook provides guidelines for the implementation of Regulation (EU) No 691/2011, Annex IV, concerning EPEA. It also provides guidelines for the implementation of a voluntary data collection beyond the legal one.

The handbook is conceived as a reference tool for data producers as regards data collection, compilation and reporting to Eurostat. It aims to facilitate the production of harmonised and comparable data across time and countries. The changes from the previous manuals are mainly due to:

- The release of a new version of the European System of Accounts (ESA 2010) and the publication of the international standard SEEA-CF 2012;
- The adoption of Regulation (EU) No 691/2011 establishing an obligation to compile and transmit to Eurostat data on EPEA;
- The lessons learnt from discussions in Eurostat's Working Groups and Task Forces on Environmental Expenditure Statistics and the experience gained in methodological and implementation projects: National Statistical Institutes have reported on the results of actions (co-financed by the Commission with grants) setting-up, completing and improving the monetary environmental accounts;⁽¹⁰⁾
- The work for an Integrated Framework of the Monetary Environmental Accounts (Eurostat, 2015b) to unify concepts and terminology about environmental activities and products.

The structure of this handbook is as follows: Chapter 2 introduces of the foundations underlying the environmental protection expenditure accounts (overview, scope delimitations and classifications); Chapter 3 presents the framework for data collection (mostly structure, definitions of variables, aggregates and the Eurostat questionnaire) in accordance with the requirements of Regulation (EU) No 691/2011 and voluntary extensions; Chapter 4 describes the data sources; Chapter 5 elaborates on methods for data collection and compilation; finally Chapter 6 suggests how to present and interpret EPEA data.

⁽⁸⁾ Regulation (EU) No 691/2011 of the European Parliament and of the Council of 6 July 2011 on European environmental economic accounts

⁽⁹⁾ Regulation (EU) No 538/2014 of the European Parliament and of the Council of 16 April 2014 amending Regulation (EU) No 691/2011 on European environmental economic accounts

⁽¹⁰⁾ A catalogue of pilot study reports with links to final reports is available: <http://ec.europa.eu/eurostat/web/environment/overview> and in Annex 3

2

Definitions, delimitations and classifications

This chapter starts with an overview of the EPEA goals and approach (section 2.1). The rest of the chapter will lay the methodological foundations to formalise the EPEA framework, namely defining the scope of EPEA and concept of environmental protection activities (section 2.2), description of specific borderline cases (section 2.3), environmental protection products (section 2.4), the economic units and institutional sectors relevant for EPEA (section 2.5) and finally the classifications used to compile EPEA and report data to Eurostat (section 2.6).

2.1. Overview of the EPEA goals and approach

This section provides an overview of the EPEA conceptual framework based on the SEEA-CF and the European System for the Collection of Economic Information on the Environment (SERIEE). The rest of Chapter 2 and Chapter 3 will provide a more rigorous formalisation of the ideas presented here, and will also propose a simplification of the conceptual framework based on practical experiences gathered along the years through data collections and pilot projects.⁽¹¹⁾ This introduction puts aside for the moment, for the sake of simplicity, aspects such as the distinction between the mandatory reporting under Regulation (EU) No 691/2011 and other voluntary reporting in the EPEA questionnaire and specific adjustments to definitions, measurement approaches or reporting conventions adopted for practical implementation reasons. Section 3.1 will take over those aspects.

SEEA-CF § 4.45 states that the purpose of EPEA is to enable identification and measurement of society's response to environmental concerns through the supply of and demand for environmental protection services and through the adoption of production and consumption behaviour aimed at preventing environmental degradation.

Consequently, EPEA seeks to assess the actual expenditure on environmental protection incurred by the total economy, i.e. the economic resources actually used in order to prevent degradation or to restore the environment. Other objectives are to measure who finances the use of these resources and which are the consequences in terms of production, employment, exports and imports as well as competitiveness for companies due to the environmental protection cost burden.

EPEA applies the principles, rules and classifications of national accounts. This includes the valuation concepts and the definitions of transactions and aggregates used in the national accounts e.g. intermediate consumption or capital formation. It also uses the national accounts grouping of institutional units into sectors, which groups together units having a similar type of economic behaviour. Following these principles ensures consistency within EPEA and with other monetary environmental accounts modules as well as comparability with national accounts aggregates. Furthermore, all the transactions in EPEA are classified by the environmental protection purpose identified in a dedicated statistical classification.⁽¹²⁾

⁽¹¹⁾ The full set of EPEA accounts according to SEEA-CF and SERIEE consist of several tables (see SEEA-CF §§ 4.49 sq. and SERIEE manual). These tables will not be used in full in this handbook

⁽¹²⁾ CEPA. This classification will be presented in section 2.6

In order to address environmental protection in the most comprehensive way, EPEA covers the following:

- a) Expenditure on environmental protection *products* by resident units
- b) Expenditure related to the *production* of environmental protection products, including the gross capital formation
- c) Transactions related to the *financing* of environmental protection expenditure

It is worth noting that:

- whereas EPEA is focused on environmental protection *expenditure*, it also sheds light on the *supply* of environmental protection;
- *products* as well as several variables related to the *production and generation of income* related to those products are covered.

A full explanation of categories a) to c) requires some methodological foundations (concepts, definitions, classifications) that are explained later in Chapter 2 but a general overview of those categories is provided here.

a) Expenditure on environmental protection products

The *environmental protection products* considered here are those products that prevent, reduce or eliminate environmental pressures. Experience shows that most of these products are *services* e.g. waste or wastewater collection and treatment services. Examples of goods are refuse containers, catalytic converters, lead free gasoline, etc.⁽¹³⁾ For practical reasons, EPEA will focus on the environmental protection *services*, which constitute the bulk of environmental protection products. For other environmental protection *goods* EPEA will focus on final consumption, which is the biggest component of uses.

The *expenditure* considered here is both final uses (final consumption, capital formation) and intermediate consumption. This is national accounts terminology. Intermediate consumption are the goods and services either transformed or used up during production processes.⁽¹⁴⁾ Households and general government incur final consumption (the latter as collective consumer whenever services produced by government are not sold). Government and corporations incur intermediate consumption and capital formation as part of their production activities.

Besides the expenditure on environmental protection products, EPEA are also interested in the supply of those products. One identity from national accounts applicable to any product is the following:

$$\text{Final consumption} + \text{Capital formation} + \text{Exports} - \text{Imports} = \text{Output} - \text{Intermediate consumption} + \text{VAT plus taxes less subsidies on products}$$

Otherwise said, the final uses of a product equal the supply of that product.⁽¹⁵⁾ The terms can be reorganised as follows:

$$\text{Final consumption} + \text{Capital formation} + \text{Intermediate consumption} = \text{Output} + \text{Imports} - \text{Exports} + \text{VAT plus taxes less subsidies on products}$$

This identity can be applied to any product, in particular to environmental protection services. The left side is the sought sum of expenditure on environmental protection products by resident units. The right side proposes an alternative calculation approach, which indeed EPEA will follow instead of the left side approach. There are several reasons for this choice, including that output is simpler to measure than final consumption, intermediate consumption and capital formation⁽¹⁶⁾; imports and exports are small; and output is also relevant by itself for analysis of production (see paragraph b) below).

Moreover, EPEA also considers the value of the environmental protection services produced in-house for internal use to reduce the environmental impact of the main production activities (ancillary output). This is

⁽¹³⁾ More precise definitions of environmental protection, products and services will be given in section 2.4

⁽¹⁴⁾ National accounts considers intermediate consumption as part of the production processes, in the supply (with negative sign) rather than in the uses. This is because intermediate consumption is not a final use. Instead the EPEA framework normally considers intermediate consumption of EP products alongside the *uses*. This approach requires some considerations to avoid double-counting

⁽¹⁵⁾ The last term on the right is needed to reconcile different valuation systems on both sides of the identity. The aggregates in the identity are valued in national accounts as follows: final consumption, capital formation and intermediate consumption are valued at purchaser's prices and output is valued at basic prices (market output) or sum of costs (non-market output). Exports of services are valued at purchaser's prices and inputs at basic prices. This is the valuation of the aggregates used in EPEA and in this handbook

⁽¹⁶⁾ Capital formation in EP products is rare. One instance is soil decontamination leading to land improvement

explicitly included in the calculation based on the right side and thus implicitly becomes part of the sum of uses on the left side.

b) Expenditure related to the production of environmental protection services

Going beyond the expenditure on environmental protection *services*, EPEA also considers some transactions related to their *production*.⁽¹⁷⁾ This regards both expenditure during the production processes and other transactions different from expenditure.

Expenditure for the production of environmental protection services includes capital formation, intermediate consumption and other forms of expenditure.⁽¹⁸⁾ Producers of environmental protection services can have intermediate consumption on environmental protection services and on other products. The former is already recorded in category a) above and indeed must be deducted to prevent double counting.⁽¹⁹⁾

Besides expenditure, EPEA provides a complete picture of production of environmental production services as regards: output, salaries (in national accounts terminology: compensation of employees), profits (in national accounts terminology: net operating surplus), certain taxes on products, depreciation of the stock of assets (in national accounts: consumption of fixed capital) and employment. There is interest in those variables for two reasons: first, to facilitate measurement of output, as some types of output (non-market and ancillary output) can only be measured as sum of the production costs; secondly those variables are relevant information by themselves e.g. what kinds of producers are involved, whether their activities are driven by commercial considerations, how efficient the production process is, what labour is required and how non-financial assets are accumulated by the producers to perform the activities. Moreover total output, value added and employment are also key variables of the environmental goods and service sector (EGSS) and this data can thus also be used to compile EGSS.

c) Financing of environmental protection expenditure

Items a) and b) above describe the expenditure actually incurred by the economic units. Besides, another relevant question for EPEA is how the national expenditure is financed. It may be that the units effectively engaged in the expenditure in environmental protection (i.e., consuming or investing) are not the same as the units financing this expenditure. For instance, this may happen if the government provides a financial contribution to another unit, who in turn will use the funds to make an investment. Such type of government contribution may take the form of a subsidy, another current transfer or a capital transfer. They lower the prices paid by purchasers of environmental protection services (in national accounts terminology these are subsidies on production) or compensate for income or capital losses related with environmental protection.

Only those transfers related to environmental protection that are not already reflected in the expenditure under categories a) and b) above need to be added, to prevent double counting.

The most relevant environmental protection transfers are those with the rest of the world. The government sector plays a central role in the distribution of the transfers.

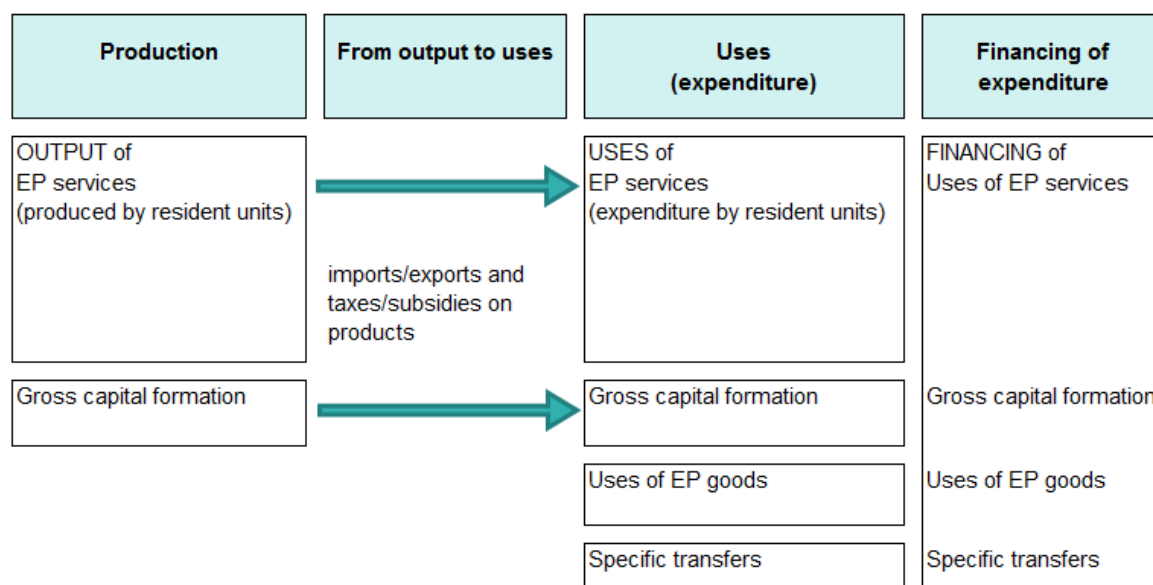
Figure 1 summarises the key contents and structure of the EPEA framework. As can be seen, the EPEA framework focuses on the supply and use of environmental protection services. Other elements, e.g. uses of environmental protection goods, are less integrated.

⁽¹⁷⁾ It is noted that EPEA only regards the production of environmental protection services and does not include the production of other environmental protection products e.g. specific EP goods and cleaner EP goods

⁽¹⁸⁾ The third type of expenditure considered above in category a), namely final consumption, is not relevant for this category b) because by definition producers of environmental protection services have no final consumption

⁽¹⁹⁾ A similar reasoning could in principle be applied to capital formation: producers of EP services can have capital formation on EP services and on other products, and the former should be deducted to prevent double counting. However in practice few services are capitalised and the deduction to prevent double counting is less pressing

Figure 1: The EPEA framework



Source: SERIEE environmental protection expenditure accounts – compilation guide (adapted)

National expenditure on environmental protection

As mentioned above, one main objective of the EPEA is to calculate the aggregate called national expenditure on environmental protection (NEEP). This aggregate represents the total economic resources that a nation uses for environmental protection. Corresponding to the categories a) to c) introduced above, the NEEP consists of:

- uses of EP services by resident units (final consumption, intermediate consumption, capital formation)
- gross capital formation for the production of environmental protection services
- environmental protection transfers to the rest of the world net of financing by the rest of the world (those transfers not already captured above).

NEEP is constructed in a way that avoids double counting and makes the sum comparable with standard national accounts' aggregates such as gross domestic product (GDP) or gross national income (GNI).

A detailed, proper calculation method for NEEP using information reported according to Regulation (EU) No 691/2011 is provided in section 3.4.

2.2. Establishing the boundaries of EPEA: environmental protection activities

Whereas EPEA applies the principles, rules and classifications of national accounts, one essential element in which they deviate is necessarily the scope of economic transactions under study in EPEA, given that it is only concerned with environmental protection whereas national accounts considers the whole economy.

Therefore it is necessary to establish the boundaries of EPEA, i.e. what's 'environmental protection' for the purpose of EPEA. The domain of study can be either based on identifying certain economic units (e.g. those producing, consuming or financing environmental protection), or certain activities (i.e., the activities related to environmental protection) or certain products (i.e., the goods and services used for EP activities). Whereas environmental protection producers, activities and products are quite closely related concepts, there is no perfect 1:1 relation between them as environmental producers may also be engaged in non-environmental activities (as secondary activities), and environmental activities may also produce non-environmental products. This handbook will establish the boundaries of EPEA based on activities. This is

also the approach followed in SEEA-CF. This is done in sections 2.2 and 2.3. Products and to some extent economic units (i.e., producers, consumers, etc.) play a pivot role in the framework, because (EP) expenditure is expenditure *on products*. Products and economic units are addressed in sections 2.4 and 2.5, respectively.

WHAT ARE ENVIRONMENTAL PROTECTION ACTIVITIES?

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

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

EPEA and this handbook focus on the first one (environmental protection, EP), but some concepts related to resource management (RM) must be presented here too in particular with a view to an integrated framework for all the monetary environmental accounts and for the sake of completeness as regards environmental activities.

Environmental protection activities are defined according to SEEA-CF (§ 4.12) as all activities and actions which have as their main purpose the prevention, reduction and elimination of pollution and of any other degradation of the environment. Those activities and actions include all measures taken in order to restore the environment after it has been degraded. Activities such as energy and material saving are only included to the extent that they mainly aim at environmental protection. An important example is recycling, which is included only to the extent that it constitutes a substitute for waste management.

Environmental protection expenditure is defined in Regulation (EU) No 691/2011 (as amended by Regulation (EU) No 638/2014) in the same way as in SEEA-CF § 4.12. The Regulation further clarifies that environmental protection expenditure is the economic resources devoted *by resident units*. The resident units determine the national economy.

This handbook calls **characteristic EP activities** the environmental protection activities that directly serve an environmental protection purpose as defined in SEEA-CF and Regulation (EU) No 691/2011. Box 1 has examples. The scope of EPEA with regard to the supply of EP services is focused on characteristic EP activities.

Activities which do not directly serve an environmental protection purpose but which produce specifically designed products whose use services an environmental protection purpose are called **non-characteristic EP activities**. Some environmental accounts, like the Environmental Goods and Services Sector accounts (EGSS), cover also the production of non-characteristic activities, but EPEA does not.

Similarly, **characteristic RM activities** are the resource management activities that directly serve a RM purpose as defined in SEEA-CF (§ 4.13), i.e. whose primary purpose is preserving and maintain the stock of natural resources and hence safeguarding against depletion. Activities which do not directly serve a resource management purpose but which produce specifically designed products whose use services an RM purpose are called **non-characteristic RM activities**. Characteristic RM and non-characteristic RM activities are out of the scope of EPEA. They are instead included in other monetary environmental accounts: resource management expenditure accounts (ReMEA) which focus on resource management activities and the EGSS which covers the production of environmental protection and resource management activities.

Box 1: Examples of environmental activities

The following are examples of characteristic and non-characteristic environmental activities:

Characteristic EP activities

- Waste and wastewater management services; monitoring of exhaust gas emissions; operation of equipment to clean exhaust gases at power plans; insulation works^(*); control and reduction of air emissions; R&D on EP

Non-characteristic EP activities

- Construction of waste treatment plants and equipment; production of noise and heat insulating materials; production of equipment to reduce air pollution

Characteristic RM activities

- Recovery of materials; desalinisation of water; production of energy from renewable sources; architectural services for passive houses; R&D on RM

Non-characteristic RM activities

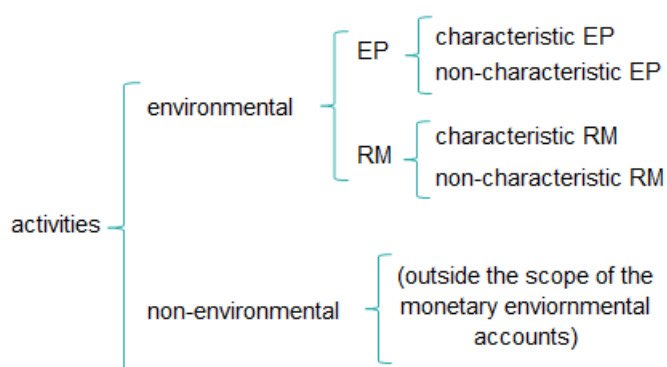
- Production of renewable energy equipment; production of thermal insulating materials; production of electric cars; production of energy efficient devices and domestic appliances

(*) For borderline between EP and RM, see Annex 4

Activities that are neither EP nor RM are non-environmental activities. These are outside the scope of EPEA. They are, for instance, activities which while beneficial to the environment primarily satisfy the technical needs or the internal requirements for hygiene or safety and security of an enterprise or other institution.

Figure 2 summarises the categories of activities.

Figure 2: Categories of activities



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

Experience over the years has shown that several interpretations of the concept of 'environmental protection' and of the determination of the purpose may exist. Compilers should know these interpretations which are described in Box 2.

Box 2: Environmental protection purpose

The environmental protection purpose criterion has a central function delimitating the scope of the EPEA. To identify environmental protection activities the SEEA-CF 2012 (section 4.2) proposes to use the primary purpose criterion, recognising that many economic activities are undertaken for a variety of purposes, environmental and non-environmental ones. The criterion requires a special explanation because its application involves a degree of subjectivity, changes over time and may not be fully comparable across countries.

Several interpretations of the primary purpose criterion are possible, e.g. as follows:

- purpose in a narrow sense, i.e. the real dominant intention or objective of actors;
- purpose laid down in legislation;
- purpose based on stated intentions, i.e. policy statements or declarations of respondents.

Actual dominant motivation and stated intentions may be difficult to observe or measure. In practice, an environmental purpose may be also identified through the following criteria:

- technical nature, i.e. inputs, production process and output characterising a given activity irrespective of legislation or revealed intentions;
- presumed effect, i.e. assumed environmental consequences of an activity or action;
- real effect, i.e. the objectively proven consequences on the environment of an activity or action.

The principal basis for determining the environmental protection purpose of an activity in this handbook is the technical nature of the produced goods and services. It determines whether or not the activity is suitable to reduce the pressure on the environment, through prevention, reduction and elimination of pollution whatever the stated motivations and presumed or real effects are.

By extension, activities that support the environmental protection activities and the use of environmental protection products (administration, education, training, information and communication services) as well as environmental protection research and development activities are also considered environmental protection activities.

From a statistical point of view, the technical nature is the most neutral basis for determining the environmental protection purpose. In fact it allows checking the purpose of production activities by considering their suitability from a technical perspective for achieving the environmental protection purpose, whatever the motivation of the agent that performs it.

The examination of the technical aspects characteristic of a given activity might provide insights concerning the presumed or real environmental effect of the use of the product. Whereas the latter can only be determined through complete life-cycle analysis, for which the complete information in most cases will not be available, the consideration of presumed effect might support the process of delineation of the environmental activities.

OPERATIONALISING THE SCOPE OF EPEA

Whereas the definitions and guiding principles explained above (e.g. 'primary purpose') define conceptually the scope of EPEA, in practice this is operationalised in terms of the Classification of Environmental Protection Activities (CEPA). CEPA is explained in section 2.6. Otherwise said, compilers of EPEA generally follow the boundary rules of CEPA to decide which transactions are to be included in or excluded from EPEA. Therefore, in practice CEPA plays a double role for EPEA: first to determine the boundaries of EPEA and secondly to define the categories of activities for reporting and analysis.

It is noted that EGSS operationalises its boundary in a different way than EPEA. EGSS uses operational lists of products and activities whereas EPEA uses the CEPA classification. It would be desirable that these two approaches are aligned.⁽²⁰⁾

⁽²⁰⁾ In the next years Eurostat will work towards streamlining them in two ways: first by enhancing the EGSS operational lists so that they can also be used for compilation of EPEA and ReMEA; secondly, by ensuring during a future revision of classifications CEPA and CReMA a consistent coverage of EGSS on the one side and EPEA plus ReMEA on the other side. A revision of these classifications is part of the SEEA CF research agenda.

2.3. Borderline cases in delimiting EPEA activities

This section addresses some borderline cases as concerns delimitation of EPEA activities

Resource management activities

As stated above, all resource management activities are outside the scope of EPEA and correspondingly inside the scope of ReMEA. Resource management activities include the preservation, maintenance and enhancement of the stock of natural resources and therefore the safeguarding of those resources against depletion (Regulation (EU) No 691/2011). Whereas environmental protection activities are classified according to the CEPA (see section 2.6 and Annex 3), resource management activities are classified according to CReMA (see section 2.6). CEPA and CReMA are mutually exclusive. Borderlines cases between them are addressed in Annex 4, e.g. regarding cleaner vs more resource efficient transport equipment, waste treatment activities whose by-products reduce use of resources (composting, material recovery) and noise abatement vs energy saving.

Distribution activities of environmental protection products

Wholesale trade and retailing of environmental products are not considered environmental activities in monetary environmental accounts (see *EGSS handbook, edition 2016*). The rationale is that in general the distribution of environmental products is not specifically designed to serve an environmental protection purpose.

However, wholesale in waste and scrap (NACE 46.77 which may include collection and sorting of waste and scrap) is often seen as a link in the production chain of waste management since it brings together supply and demand for waste and scrap. This handbook considers NACE 46.77 as a resource management activity safeguarding natural resources against depletion rather than as an environmental protection activity.

Public transport and car sharing

Development of public transport as well as car sharing and other new forms of mobility contribute to environmental protection, as far as they replace individual transport. However, they are not considered in this handbook environmental protection activities as such, not even when they use less polluting equipment.⁽²¹⁾ As stated in the CEPA 5 explanatory notes, there are in fact difficulties in separating for these activities the environmental protection purpose from other purposes (improvement of living conditions, traffic security...).

Non-environmental protection activity using environmental protection products

The use of environmental protection products as intermediate consumption for the production of other products is not a sufficient criterion to consider these other products (and the corresponding activities) as environmental. For example, the packaging of a product with biodegradable plastics (biodegradable bags) or the cleansing activity using particularly environmentally friendly detergents are not environmental protection activities.

Correspondingly, if a producer has an ancillary environmental protection activity, the principal and secondary activities supported by this ancillary activity are not necessarily environmental protection activities and the output of the principal and secondary activities is not necessarily an environmental product either.

Other environmentally related activities

Also excluded from EPEA are activities which, while having a positive impact on the environment, are carried out to protect workers (e.g. against exposition to pollutants and noise), protect human establishments against natural hazards and effects of climate change (e.g. floods, landslides, volcanic eruptions, tempests) and technological hazards (e.g. external safety of industrial establishments). Also excluded are cleaning services for specific technical purposes (e.g. purification of water or air for specific industrial processes; clean rooms) and activities aiming to protect and manage the impact of environmental changes on people and produced assets (cleaning or restoring building dirtied or damaged by air pollution, hospital treatment for people adversely affected by poor-quality environment...).

⁽²¹⁾ For national purposes countries may record these activities as peripheral environmental activities outside the EPEA scope

Activities outside the national accounts production boundary

Consistently with national accounts, excluded from the scope of EPEA are all natural processes which have no human involvement or direction such as the unmanaged growth of wild fauna and flora (ESA §3.07); also excluded are “Ecosystem services”, i.e. the contributions of ecosystems to benefits used in economic and other human activity (e.g. extracted natural resources, carbon sequestration and recreational opportunities) (SEEA-CF § 4.31).

2.4. Environmental protection products

Products play a very important role in EPEA because the expenditure on environmental protection is mostly about expenditure on *products*.

Environmental products are produced, designed and manufactured for purposes of environmental protection and resource management. Other products are non-environmental. This handbook will distinguish between products for environmental protection and for resource management, as EPEA focuses on the former.

Environmental protection products can be categorised by whether they have a primary or secondary environmental protection purpose. Products whose primary purpose is environmental protection will be called **specific EP products** in this handbook.⁽²²⁾ 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. This handbook will call them **cleaner EP products**. Box 3 has examples.

As cleaner products do not serve a primary environmental protection purpose, EPEA does not account the expenditure on these products at their full value. Only the 'environmental protection share' should be accounted for, which can be measured by the extra cost of the cleaner product compared to an equivalent normal product. This principle is known as extra costs valuation. This is further addressed in section 5.5.2.1.

EP products may be goods or services. Specific EP services will also be called in this handbook **environmental protection services**, or EP services for short.⁽²³⁾ Instead, specific EP goods correspond to the concept of connected goods in SEEA-CF and other manuals (see Box 4). Cleaner EP products correspond to the concept of adapted goods in SEEA-CF and other manuals. Adapted services in principle may exist but de facto are rare.

Resource management products can be classified similarly to done for EP products, into **specific RM products** and **resource efficient RM products**, depending on whether they have a primary or secondary RM purpose. Those products categories are not needed for EPEA but they are introduced here for completeness as part of an integrated framework for monetary environmental accounts.

Box 3: Examples of environmental products

The following are examples of specific and cleaner or resource efficient products:

Specific EP products

- Waste and wastewater management services; waste and wastewater plants and equipment; waste disposers; refuse bins; septic tanks; catalytic converters for vehicles; equipment to reduce air pollution; noise-insulating materials; R&D on EP

Cleaner EP products

- Products of organic farming; low sulphur fuels; low air emission motor vehicles; mercury-free batteries; CFC-free products

Specific RM products

- Thermal insulating materials; heat pumps; energy from renewable sources; equipment

⁽²²⁾ For a sake of clarity this handbook will avoid the term 'characteristic products' and reserve it for characteristic activities, as explained above

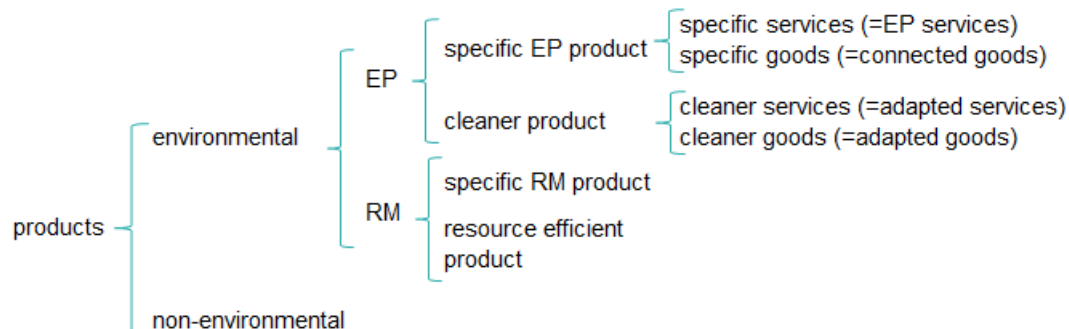
⁽²³⁾ 'Environmental protection services' is also the term used in Regulation (EU) 691/2011, Annex IV

for the production of energy from renewable sources; technical services for renewable energy plants; R&D on RM

Resource efficient RM products

- Secondary raw materials; passive houses; energy efficient domestic appliances and devices; electric cars; energy efficient motors

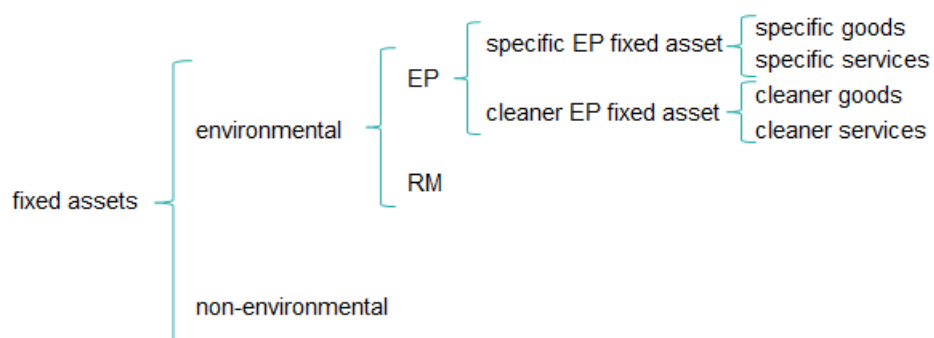
Figure 3: Categories of products



Experience shows that in most countries the EP services constitute the bulk of the environmental protection products. Examples of EP services are waste and wastewater management services. For this reason, the mandatory part of EPEA according the Regulation (EU) No 691/2011 only covers environmental protection services. This is a fundamental feature with implications throughout this handbook. EPEA also collects in the voluntary part the final consumption by households of specific EP goods (=connected goods) and cleaner EP goods (=adapted goods).

A similar terminology is needed for fixed assets, with a view to account for capital expenditure.⁽²⁴⁾ Fixed assets may either be goods (equipment and plant) or services (R&D, technical services). Fixed assets can be environmental-related or non-environmental-related. The former are sub-classified into assets for environmental protection and assets for resource management. Assets for environmental protection may have a primary EP purpose or a secondary EP purpose. They will be called **specific EP fixed assets** and **cleaner EP fixed assets**, respectively.

Figure 4: Categories of fixed assets



This classification is more relevant for some producers than for others. In the case of specialist producers (see definition in section 2.5), it is assumed that all their fixed assets are used for EP activities. For them there is no need to distinguish between specific (=primary EP purpose) and cleaner fixed assets (=secondary EP purpose). Instead this typology of assets makes more sense when the principal activity of the producer is not an EP activity. In that case, assets with primary EP purpose correspond to the concept 'end-of pipe technologies' from SEEA-CF and other manuals (see Box 4). Correspondingly, assets with

⁽²⁴⁾ In EPEA, as well as in national accounts, the net changes in the stock of fixed assets are called gross fixed capital formation (GFCF). This corresponds to the concept of (net) investment or capital expenditure

secondary EP purpose correspond to 'integrated technologies'. The voluntary part of EPEA collects gross fixed capital formation in EP fixed assets (i.e. end-of-pipe technologies and integrated technologies) by ancillary producers.

Box 4: Other terminology for environmental products

The categorisation of products introduced in this section (*specific products*, *cleaner products*, *specific fixed assets* and *cleaner fixed assets*) is part of the Eurostat effort to set up an integrated framework for all the monetary environmental accounts. This effort included grouping the various terminology used in previous manuals and frameworks into meaningful categories that apply to all monetary environmental accounts in order to ease the compilation of the various accounts and better exploit synergies between them. Some new terms are proposed for capital expenditure.

Previous manuals and frameworks used the following terms: connected products, adapted goods, investment in 'end-of-pipe' technologies and investment in 'integrated' technologies. SEEA-CF 2012 provides definitions of EP connected products⁽²⁵⁾ (§ 4.65), adapted goods (§ 4.67, § 4.99) and environmental technologies (§ 4.72), the latter distinguishing between 'end-of-pipe' technologies and 'integrated' technologies.

For completeness, these SEEA-CF definitions are listed here:

- Environmental protection connected products are products whose use directly serves environmental protection purposes but which are not environmental protection specific services or inputs into characteristic activities. Examples of connected products include septic tanks, maintenance services and other products for septic tanks, catalytic converters for vehicles, trash bags, bins, rubbish containers and compost containers;
- Adapted goods are goods that have been specifically modified to be more "environmentally friendly" or "cleaner" and whose use is therefore beneficial for environmental protection. Examples of adapted goods include desulphurized fuels, mercury-free batteries and CFC-free products.

Connected products must be typical and 'sole use' (for environmental purposes only). Adapted products are 'double use' (for environmental and non-environmental purposes).

- Expenditure on 'end-of-pipe' technologies used to treat, handle or dispose of emissions and wastes from production. This type of expenditure is normally easily identified even within the context of own-account activity because it is usually directed towards an 'add on' technology which removes, transforms or reduces emissions and discharges at the end of the production process. This corresponds to production treatment technologies;
- Expenditure on 'integrated' technologies, also called cleaner technologies. These are new or modified production facilities designed to ensure that environmental protection is an integral part of the production process, thereby reducing or eliminating emissions and discharges and thus the need for end-of-pipe equipment. This corresponds to pollution prevention technologies.

Those definitions of investment in end-of-pipe technologies and integrated technologies are the basis for the definitions used in business statistics (see section 4.2.2).

Environmental technologies are by themselves not products, but investment goods using those technologies are obviously products and they can be classified with the integrated framework terminology explained above.

⁽²⁵⁾ In SNA 2008 § 29.60 this category includes products whose uses are interesting because they are clearly covered by the concept of (environmental) expenditure in a given field, without being typical

2.5. Statistical units in EPEA

EPEA use statistical units from national accounts. National accounts define and use various statistical units and groupings of units that interact economically (see ESA 2010, §§ 1.54-1.56, 2.01-2.03).

Contrarily to EGSS, EPEA record transactions that are not limited to production but encompass also consumption and financing. For this reason, whereas EGSS is focused on *production* units, EPEA uses more general types of economic units.

2.5.1. Institutional units and sectors

Probably the most central unit used in national accounts is the so-called institutional unit which is defined as “an economic entity characterised by decision-making autonomy” (ESA 2010, §§ 1.57, 2.12).

Macroeconomic analysis does not consider the actions of each institutional unit separately: it considers the aggregate activities of similar institutions. In national accounts units are combined into groups called institutional sectors, some of which are divided into subsectors (ESA 2010 § 2.31). Each sector and subsector groups together the institutional units which have a similar type of economic behaviour. EPEA records transactions between institutional sectors, not within the individual units in the same sector (exceptions to this rule exist).

A very important concept is that of resident units. The resident units constitute the economy of a country (ESA 2010 § 2.04). The concept of resident units must be understood in the same way as national accounts, i.e. a unit resident in an economy has its centre of predominant economic interest in the economic territory of the country (ESA 2010 § 2.04). The economic territory and the centre of predominant economic interest are defined in ESA 2010 §§ 2.05 to 2.07.

The institutional sectors in ESA 2010 are non-financial corporations, financial corporations, general government, households, non-profit institutions serving households, and the rest of the world. EPEA further groups those sectors for simplification. This is important because the groupings of sectors for EPEA determine the data compilation and reporting, as well as they constrain the analysis of results. For instance, EPEA considering the transfers between groupings of sectors different from those explained below will require extra work or not be possible at all. The fact that some transfers are consolidated within certain sectors (e.g. government) also has consequences on the analysis of the results.

The groupings of institutional sectors used in EPEA are the following:

GENERAL GOVERNMENT AND NON-PROFIT INSTITUTIONS SERVING HOUSEHOLDS

ESA 2010 (§ 2.111) defines the general government sector as the grouping of institutional units which are non-market producers (see definition in section 3.2.1) whose output is intended for individual and collective consumption, and are financed by compulsory payments made by units belonging to other sectors, and institutional units principally engaged in the redistribution of national income and wealth.

The institutional units classified in the general government sector are non-market producers but they may have some secondary market output.

The non-profit institutions serving households (NPISH) sector consists of non-profit institutions which are separate legal entities, which serve households and which are private non-market producers. Their principal resources are voluntary contributions in cash or in kind from households in their capacity as consumers, from payments made by general government and from property income (ESA 2010, § 2.129).

EPEA records together the transactions of general government and NPISH. Transactions recorded relate to the production of environmental protection services, including gross fixed capital formation and acquisitions less disposals of non-produced non-financial assets for the production of environmental protection services, intermediate consumption and final consumption of environmental protection services and transfers for environmental protection paid or received.

NON-FINANCIAL AND FINANCIAL CORPORATIONS

The non-financial corporations sector consists of institutional units which are independent legal entities and market producers, and whose principal activity is the production of goods and non-financial services. The non-financial corporations sector also includes non-financial quasi-corporations (ESA 2010, § 2.45).

The financial corporations sector consists of institutional units which are independent legal entities and market producers, and whose principal activity is the production of financial services (ESA 2010, § 2.55).

EPEA records the transactions of financial and non-financial corporations together. Transactions recorded concern the production of environmental protection services, including gross fixed capital formation and acquisitions less disposals of non-produced non-financial assets for production of environmental protection services, intermediate consumption of environmental protection services and transfers for environmental protection received, as well as some taxes payments.

HOUSEHOLDS

ESA 2010 (§ 2.118) defines the household sector as individuals or groups of individuals as consumers and as entrepreneurs producing market goods and services provided that this production is not by separate entities classified in the corporations sector. It also includes individuals or groups of individuals as producers of goods and services for exclusively own final use.

For the purpose of EPEA, individuals acting as entrepreneurs producing market goods and services or goods and services for exclusively own final use are classified together with corporations; the EPEA households sector only records the transactions of households in their capacity of consumers.

Transactions of the household sector recorded in EPEA are the final consumption of environmental protection services, transfers for environmental protection received and – on a voluntary basis – final consumption of EP products other than EP services and earmarked taxes paid.

REST OF THE WORLD

The rest of the world sector consists of non-resident units insofar they are engaged in transactions with resident institutional units, or have other economic links with resident units. The institutions of the EU and international organisations are included in EPEA as part of the rest of the world sector (ESA 2010, § 2.131).

Transactions recorded for the rest of the world sector in EPEA are the imports and exports of environmental protection services and environmental protection transfers received and paid.

2.5.2. Local kind of activity units. Producers of environmental protection services

Whereas the main goal of EPEA is analysing expenditure and financing of environmental protection, it also covers activities of production related to environmental protection.

For the purpose of analysing production, national accounts propose to divide/decompose institutional units into smaller units which are more homogenous with regards to the various production activities and location. These more homogenous units are called local kind-of-activity units – local KAUs (ESA 2010, §§ 1.58, 2.144-2.149).⁽²⁶⁾ Local KAUs are the smallest economic entity in national accounts. Local KAUs do not necessarily have decision-making autonomy as they may be part of a larger institutional unit who has the decision-making.

A producer may carry an environmental protection activity as principal, secondary or ancillary activity. The principal activity of a local KAU is the activity for which the value added exceeds that of any other activity carried out within the same unit (ESA 2010, § 3.10).

A secondary activity is an activity carried out within a single local KAU in addition to the principal activity (ESA 2010, § 3.11). The output of the secondary activity is a secondary product e.g. waste water treatment carried out by a local KAU whose principal activity is water supply.

An ancillary activity is an activity whose output is intended for use within an enterprise (ESA 2010, § 3.12). Ancillary environmental protection activities directly serve an environmental purpose and result in products for use (other than gross capital formation) within the same establishment to support its principal and secondary activities (e.g. in-house environmental protection services such as monitoring of exhaust gas emissions, or in-house treatment of waste water). Whereas in national accounts ancillary activities are not isolated to form distinct entities or separated from the principal or secondary activities or entities they serve, they are separated in monetary environmental accounts and thus in EPEA.

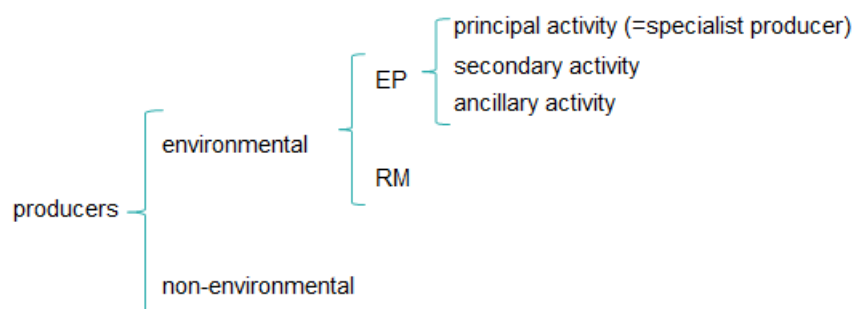
⁽²⁶⁾ ESA 2010 "local KAU" is called "establishment" in SNA 2008 (ESA 2010, § 2.148)

SPECIALIST PRODUCERS

Producer units can engage in the production of EP services as part of their principal, secondary or ancillary activity.

Specialist EP producers are local KAU whose primary activity is the production of EP services. EP secondary producers are local KAU which produce EP services as secondary activity. **Ancillary EP producers** are local KAU which produce EP services as ancillary activity; otherwise said: they do not sell their EP production to other economic units but consume the outputs themselves.

Figure 5: Categories of producers



Specialist EP producers operate in few economic activities and produce most of the EP services. They mainly operate in activities NACE 37, 38.1, 38.2 and 39 but may also be found in a few other NACE codes (see Annex 1). Secondary EP producers are expected to have minor importance for EPEA and compiling figures for them is more labour-intensive. They can be found in some countries in NACE 36 (water supply companies which e.g. also collect and treat wastewater) or NACE 35 (electricity, gas and steam supply companies which e.g. also treat waste) as well as in other industries. Ancillary EP producers can operate in any NACE and could potentially include households too.

Because secondary producers are less important in EPEA than specialist or ancillary producers, they are frequently grouped together with one of the other two categories:

- EPEA focuses on specialist producers (as opposed to non-specialist producers), and thus groups secondary producers with ancillary producers, in particular to identify the intermediate consumption of specialist producers in order to prevent double counting in the national expenditure on environmental protection. This is the purpose of the mandatory variable P2_EPS_SP. There are also practical reasons to focus on the specialist producers because they concentrate most of the production of EP services in a few economic activities, making the compilation process simpler and with higher return.
- EPEA focuses on ancillary producers, and thus groups specialist producers with secondary producers, in particular in the questionnaire structure: Table 3 is devoted to ancillary producers and Table 2 to non-ancillary producers in the corporation sector. Some EPEA variables are only collected for ancillary producers, e.g. GFCF on specific EP fixed assets and cleaner EP fixed assets. Because of the structure of the questionnaire, some CEPA breakdowns are asked differently for ancillary and non-ancillary producers. General-purpose data sources may be available, e.g. the structural business survey, from which useful information about ancillary EP producers may be derived for EPEA purposes.

This handbook will reserve the term 'specialist EP producers' for specialist EP producers in the corporation sector (if there are exceptions it will be stated explicitly). Whereas all types of producers (principal, secondary, ancillary) can be found either in government or corporation sectors, all types of producers (principal, secondary, ancillary) in the government sector are reported together in the questionnaire Table 1, with no distinction made. This is both for conceptual and practical reasons.⁽²⁷⁾

⁽²⁷⁾ The functions of government units differ across countries e.g. in some countries government contracts out the production of specific EP products to the private sector, whereas in other countries government sets up production units for this purpose. In the former case, all the units in the government sector engaged in production of EP services can be assumed to be specialist producers. Secondly, there are also differences across countries in the recording in the data sources for EPEA e.g. whether the underlying statistical unit in COFOG data is the institutional unit or the local KAU. This matters for where the secondary activities are recorded

Instead the producers in the corporation sector are reported in two different tables: specialist producers and secondary producers in Table 2 and ancillary producers in Table 3. Therefore, this handbook will present the specialist producers as a sub-sector of the corporation sector.

Much care is necessary to ensure the different types of producers (principal, secondary, ancillary) in the government sector and corporation sector are reported correctly in the questionnaire Tables 1 to 3, and without double reporting. Frequently the data sources for EPEA require special processing to ensure it. For instance, some data sources normally provide data for specialist producers separately from secondary producers (e.g. SBS) whereas others may report together specialist and secondary producers (e.g. supply-use tables). In general, a compilation approach of EPEA industry by industry (i.e. based on NACE) with no distinction by sector may lead to units from the government sector being wrongly recorded as specialist units in Table 2. In practice, sometimes this outcome is unavoidable and must be accepted as a practical compromise, but conceptually this handbook presents the EPEA questionnaire tables structured by sector with specialist producers as a sub-sector of the corporation sector.

INDUSTRIES

Local KAUs engaged in the same or similar kind-of-activity can be grouped into industries (ESA 2010, §§ 1.59, 2.150-2.152). Local KAUs and industries are suited to analyse production processes and technico-economic relationships (ESA 2010, § 2.03). Industries are classified according to the Statistical Classification of Economic Activities in the European Community, NACE Rev. 2 (Eurostat, 2008).

Industries group together local KAUs irrespective of their market or non-market character. Whenever an institutional unit of the general government sector is split into several local KAUs, these local KAUs are grouped into the industries corresponding to their principal activity. Therefore, for the analysis of production, the general government institutional sector may be decomposed by industries; conversely production activities of industries may be reallocated by institutional sectors. The EPEA framework collects very few data by industry: only for corporations as ancillary producers, i.e., different from specialist producers and secondary producers. This includes some transactions in the mandatory part of the questionnaire and some others in the voluntary part. Some countries may find it useful to set up a compilation system by industry more ambitious than the strictly necessary to report the information in the EPEA questionnaire. This makes sense particularly as part of an integrated framework for monetary environmental accounts. More about this in Annex 5.

STATISTICAL UNITS FOR THE COMPILATION OF EPEA

As a question of principle, it is recommended to divide the institutional units into as many local KAUs as there are activities performed by the institutional unit and situated in a geographically identified place. It requires that the information system of the institutional units is capable of indicating or calculating for each local KAU at least the value of production, intermediate consumption, compensation of employees, operating surplus, employment and gross fixed capital formation.

However, in practice EPEA compilers use different national sources, which come with their own units. For example a compilation approach starting with general government transactions will be based on institutional units.

Moreover, if the accounting documents (data sources) needed to describe such details are not available, it is not possible to decompose institutional units into homogenous local KAUs undertaking each only one activity. Hence in practice local KAUs may also include one or several secondary activities beside their principal activity. The homogeneity of local KAUs vary across countries depending on the primary data sources compilers have available.

This limitation has practical consequences. Depending on the working unit for the compilation of EPEA (i.e. local KAU or institutional unit) the units will be more or less homogeneous, they will have more or less secondary activities, the distinction between principal and secondary activities will be less neat, and the identification of specialist producers may be affected. Whenever data sources with different underlying data sources are combined the (units underlying the) result may be uncertain. The estimates for specialist producers may be different depending on whether the EPEA compilers work at local KAU or institutional unit level.

2.6. Classifications

Regulation (EU) No 691/2011 requires that EPEA data are classified by CEPA and, in addition, for ancillary activities, by NACE.

CLASSIFICATION OF ENVIRONMENTAL PROTECTION ACTIVITIES

The functional Classification of Environmental Protection Activities (CEPA 2000) is a generic, multi-purpose, functional classification of environmental protection activities. CEPA was adopted as an international standard at the meeting of the UN Statistical Commission held in March 2002.

CEPA is not only used to classify activities. It can also be used to classify products, transfers and all the EPEA characteristics.

CEPA covers nine classes (see Table 1 below). A simplified description of the CEPA classification is available in Annex 3 (also available in the SEEA-CF 2012, Annex I and in Eurostat's Reference And Management Of Nomenclatures database, RAMON⁽²⁸⁾). It provides definitions of the CEPA classes and some guidance on inclusions and exclusions.

Table 1: Classification of environmental protection activities (CEPA 2000)

CEPA class	Classification of Environmental Protection Activities
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
6	Protection of biodiversity and landscapes
7	Protection against radiation
8	Environmental research and development
9	Other environmental protection activities

Regulation (EU) No 691/2011 requires the reporting by certain groupings of CEPA, as follows:

For general government and for environmental protection transfers:

- CEPA 2
- CEPA 3
- Sum of CEPA 1, CEPA 4, CEPA 5 and CEPA 7
- CEPA 6
- Sum of CEPA 8 and CEPA 9

For corporations as secondary and specialist market producers of EP services:

- CEPA 2
- CEPA 3
- CEPA 4

For corporations other (also covering producers of ancillary EP services)

⁽²⁸⁾ http://ec.europa.eu/eurostat/ramon/index.cfm?TargetUrl=DSP_PUB_WELC

- CEPA 1
- CEPA 2
- CEPA 3
- Sum of CEPA 4, CEPA 5, CEPA 6, CEPA 7, CEPA 8 and CEPA 9

For households as consumers:

- CEPA 2
- CEPA 3

Besides, data can be reported with a full breakdown by CEPA classes and one 'of which' subcategory for CEPA 1.1.2 and 1.2.2 Climate change, on voluntary basis.

CLASSIFICATION OF RESOURCE MANAGEMENT ACTIVITIES

The classification of resources management activities (CReMA) is a generic, multi-purpose, functional classification of resource management. CReMA is not used in EPEA because resource management activities are out of scope of EPEA. However, CReMA is relevant insofar it must have no overlaps with CEPA.

In order to provide a complete classification of environmental activities (CEA), SEEA-CF complemented CEPA with a classification of resource management activities. This is an interim classification. For EGSS and ReMEA purposes Eurostat developed its own classification of resource management activities, the CReMA (see *EGSS handbook 2016* and the *working group version of the ReMEA handbook 2014*).

CReMA distinguishes seven main classes: management of water (CReMA 10), management of forest resources (CReMA 11), management of wild flora and fauna (CReMA 12), management of energy resources (CReMA 13), management of minerals (CReMA 14), research and development activities for resource management (CReMA 15) and other resource management activities (CReMA 16).

Borderline cases between CEPA and CReMA are addressed in Annex 4.

NACE CLASSIFICATION

Regulation (EU) No 691/2011 requires that data on ancillary producers are reported broken down by NACE Rev.2 sections B, C, D and Division 36. Data for section C shall be presented by divisions, divisions 10-12, 13-15 and 31-32 being grouped together. Data related to other NACE sections (A and F to U) may be reported voluntarily. The reporting categories in the EPEA questionnaire are shown in Table 2.

Table 2: NACE aggregation level for mandatory reporting of ancillary activities

NACE Rev. 2 section	NACE Rev. 2 division	Description
B		Mining and quarrying
C		Manufacturing
	10-12	Manufacture of food products, beverages and tobacco products
	13-15	Manufacture of textiles, wearing apparel, leather and related products
	16	Manufacture of wood and of products of wood and cork
	17	Manufacture of paper and paper products
	18	Printing and reproduction of recorded media
	19	Manufacture of coke and refined petroleum products
	20	Manufacture of chemicals and chemical products
	21	Manufacture of basic pharmaceutical products and pharmaceutical preparations
	22	Manufacture of rubber and plastic products
	23	Manufacture of other non-metallic mineral products
	24	Manufacture of basic metals
	25	Manufacture of fabricated metal products
	26	Manufacture of computer
	27	Manufacture of electrical equipment
	28	Manufacture of machinery and equipment n.e.c.
	29	Manufacture of motor vehicles
	30	Manufacture of other transport equipment
	31-32	Manufacture of furniture and other manufacturing
	33	Repair and installation of machinery and equipment
D	35	Electricity, gas, steam and air conditioning supply
E	36	Water collection, treatment and supply

Contrarily to CEPA, which is used to classify any EPEA characteristic, NACE is only used to classify production activities and production-related characteristics like output, employment, compensation of employees, intermediate consumption, GFCF, etc. but not final consumption nor transfers.

EPEA collects the following characteristics by NACE (meaning the industry where the producing unit is classified for its principal activity):

Mandatory characteristics:

- Ancillary EP output (simplified valuation legally acceptable)
- GFCF and acquisitions less disposals of non-financial, non-produced assets (ancillary producers)

Voluntary characteristics:

- GFCF on specific EP fixed assets (formerly called end-of pipe investments)
- GFCF on cleaner EP fixed assets (formerly called investments in integrated technologies)
- Intermediate consumption by producers of EP services
- Intermediate consumption of EP services by producers of EP services
- Intermediate consumption of products different from EP services by producers of EP services
- Compensation of employees
- Ancillary EP output (ESA compatible valuation)
- Other taxes less subsidies on production
- Consumption of fixed capital

- Related non-EP output (formerly called receipts from by-products)
- Employment
- Intermediate consumption of EP services by all producers

3

Framework for data collection

This chapter presents the framework for the Eurostat EPEA data collection, building on the methodological foundations explained in Chapter 2. It covers both the mandatory data collection according to Regulation (EU) No 691/2011 and additional data collected on a voluntary basis.

Section 3.1 first revisits the EPEA framework already introduced in Chapter 2, in order to further precise which components are part of the data collection. Section 3.2 explains systematically the EPEA characteristics, distinguishing between the mandatory and voluntary reporting. Section 3.3 presents the reporting tables of the EPEA questionnaire. Section 3.4 addresses the calculation of national expenditure on environmental protection, which is a most important aggregate.

3.1. Overview of the EPEA framework

This section revisits the description of the objectives and framework of EPEA already presented in section 2.1 with the goals of increase accuracy in the explanations, explain the practical compromises in the EPEA data collection and distinguish between the mandatory and voluntary parts of the data collection.

Because the full EPEA framework in SEEA-CF is quite expensive in terms of resources to be set up, this handbook proposes a simplified EPEA framework. Furthermore, the EPEA module under Regulation (EU) No 691/2011 is even simpler while still allowing a measure of environmental protection expenditure for the whole economy comparable with national accounts aggregates.

Environmental protection expenditure accounts present data on the economic resources devoted by resident units to environmental protection. In a national accounts perspective, environmental protection expenditure is defined in the Regulation (EU) No 691/2011 EPEA module as:

- the sum of uses of EP services by resident units. Uses are either final uses (final consumption or capital formation) or intermediate consumption. EP expenditure also includes the value of the EP services produced in-house for internal use (ancillary EP output)
- plus the gross fixed capital formation (GFCF) for the production of EP services
- plus the transfers for environmental protection which are not a counterpart of previous items, less financing by the rest of the world


Because the sum of uses of EP services is actually calculated from the supply side, this explanation is structured along the following four groupings of transactions:

- Production of environmental protection services;
- Transition from production of environmental protection services by resident units to uses of environmental protection services by resident units;
- Uses of environmental protection services;

- Environmental protection transfers.

This is the structure of transactions that will be followed in the rest of the handbook. Each grouping of transactions is linked to the next one, and can be used to derive NEEP as shown in Table 3.

Table 3: Calculation flow for NEEP

1	Output of EP services at basic prices
2	- Intermediate consumption of EP services by producers of EP services
3	+ Imports of EP services
4	- Exports of EP services
5	+ Items to adjust the valuation of EP services from basic price to purchaser's price
6	= Supply of EP services available to resident units, at purchaser's prices
	
7	= Uses of EP services by resident units at purchaser's prices (6=7)
8	of which final consumption
9	+ Gross fixed capital formation ⁽¹⁾ for production of EP services
10	+ Environmental protection transfers paid to the rest of the world
11	= Expenditure for environmental protection by resident units
12	- Environmental protection transfers received from the rest of the world
13	= National Expenditure on Environmental Protection (NEEP)

⁽¹⁾ plus acquisitions less disposals of non-produced non-financial assets

Table 3 shows that total output of EP services at basic prices, minus intermediate consumption of these services by producers of EP services, plus imports minus exports, plus the necessary adjustments to ensure that supply and demand follow the same valuation, equals **the supply of EP services for use by resident units at purchaser's prices**. Adding gross fixed capital formation and acquisitions less disposals of non-produced non-financial assets for the production of EP services and adding environmental transfers paid to the rest of the world and deducting transfers received from the rest of the world leads to **national expenditure on environmental protection (NEEP)**. This flow provides identical NEEP result as calculated summing all types of expenditure: final consumption, intermediate consumption, GFCF and net transfers from/to the rest of the world, with the additional advantage that it provides more information about the production of environmental protection. Table 3 is more an outlook to the EPEA framework than an algorithm to calculate NEEP. A fully accurate calculation of NEEP is provided in section 3.4.

The four categories of EPEA transactions are explained next in more detail.

Transactions related to the production of environmental protection services

- This category includes: output (i.e. the result of production), employment, compensation of employees (i.e. salaries), net operating surplus (i.e. a national accounts aggregate representing businesses' profits) and other variables. Capital formation can also be considered in this category; however Table 3 presents it as part of the uses in the NEEP.

- Firstly it must be noted that Regulation (EU) No 691/2011 does not cover all environmental protection products but only environmental protection *services* (EP services for short) with regard to transactions related to production of environmental protection.

This handbook adopts the delimitation between goods and services of the Balance of Payments. Services correspond to products described at international level by the Extended Balance of Payments Services (EBOPS) classification.⁽²⁹⁾ This includes, among others: waste treatment and depollution; architectural, engineering, scientific and other technical services; R&D services; construction services; maintenance and repair services; other business services. Goods correspond to commodities described at international level by the Standard International Trade Classification (SITC) and the Harmonized Commodity Description and Coding System (HS) and at European level by the Combined Nomenclature, a European classification of goods used for foreign trade statistics (CN).

- The mandatory part of EPEA collects output of EP services (P1).⁽³⁰⁾ This output may be market output (P11), non-market output (P13), output produced for own final use or ancillary output. It may be produced by the corporation sector or by the government sector or output for own final use by the households (in the latter case it is reported in the questionnaire together with the output of specialist EP producers).

The voluntary part of the data collection asks for additional output breakdowns (P11_MA, P11_SA) or valuation (P1_ANC_ESA) but it does not request for a broader scope of output than the mandatory collection. Therefore all the production in EPEA, also in the voluntary part, regards only EP services.

Ancillary output is difficult to estimate. For this reason the mandatory part of the collection accepts a simpler, less accurate estimation method (called 'simplified valuation legally acceptable', P1_ANC, calculated as compensation of employees plus intermediate consumption for environmental protection less intermediate consumption of EP services) whereas the voluntary part asks for a more accurate but more demanding method (called 'ESA compatible valuation', P1_ANC_ESA, calculated as compensation of employees plus intermediate consumption for environmental protection, less intermediate consumption of EP services plus other taxes less subsidies on production plus consumption of fixed capital).

- The mandatory collection requires reporting the intermediate consumption by specialist producers for the production of EP services (P2_EPS_SP). This variable must be deducted from the output (P1) to avoid double counting in the calculation of national expenditure on environmental protection (see explanation in section 2.1 b).

Intermediate consumption for the production of EP services by all types of producers (P2) is part of the voluntary collection. The products consumed as intermediate consumption can be EP services (P2_EPS) or other products than EP services (P2_NEPS); hence P2 is the sum of P2_EPS and P2_NEPS.

- EPEA also studies the capital formation for the production of EP services. As regards capital expenditure, national accounts distinguish two types of assets relevant for EPEA, called fixed assets and non-produced non-financial assets.

Fixed assets are produced assets used in production for more than one year, e.g. machinery, buildings, etc. The concept for changes in fixed assets used in national accounts is gross capital formation, which in turn has three components: gross fixed capital formation, changes in inventories and acquisitions less disposals of valuables (ESA 2010 § 3.122). Only the first one is relevant for EPEA. The changes in inventories are about goods, not (EP) services, as services are consumed at the time they are produced. Valuables are jewellery, antiques, and other goods with no relation to environmental protection, therefore out of the scope of EPEA. Thus, EPEA uses de facto gross fixed capital formation (GFCF) instead of gross capital formation for changes in fixed assets.

⁽²⁹⁾ <http://ec.europa.eu/eurostat/web/international-trade-in-services/methodology>

⁽³⁰⁾ The codes in brackets following the transaction names are the codes of EPEA transactions. These codes are derived from ESA 2010

Non-produced non-financial assets are typically natural resources (land, mineral and energy reserves, water, etc.), of which only land may be of relevance for EPEA. The corresponding transaction in national accounts is called 'acquisitions less disposals of non-produced, non-financial assets'.

- The mandatory part of EPEA collects the GFCF for the production of EP services and acquisitions less disposals of non-produced, non-financial assets for the production of EP services (P51G_NP). EPEA reports them together for simplicity. Practical experience suggests that net acquisition of land is not very important at the aggregate level (less than 5% of gross fixed capital formation)

Besides, the EPEA framework collects two types of capital expenditure by ancillary producers of EP services. They are about GFCF on environmental fixed assets, distinguishing specific EP fixed assets (INV_EOP; 'end-of-pipe technologies') and cleaner EP fixed assets (INV_IT; 'integrated technologies'). INV_EOP is the investment expenditure to collect and remove pollutants after their creation, instead INV_IT serve to reduce the amount of pollution generated. These are voluntary variables and for this reason they are not used in the calculation of NEEP nor are shown in Table 3, in order not to jeopardise comparability between countries reporting those variables and others not reporting them.

- EPEA collects in the voluntary part several other variables which complete the information about the production and generation of income by producers of EP services. This includes employment (EMP), compensation of employees (D1) and net operating surplus (B2N). The latter represents the profits of the producers of EP services. They are all voluntary variables and only concern producers of EP services.

Moreover, the following variables are collected to allow the calculation of net operating surplus: related non-EP output (RNO), other taxes less subsidies on production (D29-39), and consumption of fixed capital (P51C). B2N is calculated as the sum of $P1 + RNO - P2 - D1 - P51C - D29-D39$.

Related non-EP output (formerly called receipts by by-products) is by-products of characteristic EP activities that are not EP products and have economic value. Examples include energy generated or material recovered, as a result of waste treatment.

Net operating surplus (B2N) should be zero for institutional units that are non-market producers (general government and NPISHs whose output is valued as sum of costs). Besides there is one variable for the special case of those local KAUs of the general government sector which are market producers and correspondingly can create a profit (negative net operating surplus of market producers in the general government sector, NEGB2_GG).

Transactions related to the transition from *production* of environmental protection products by resident units to *uses* of environmental protection products by resident units

- This category includes: imports of EP services (P7), exports of EP services (P6) and VAT plus other taxes on EP services less subsidies on EP services (D21-31). All those variables are mandatory.

The adjustment valuation from basic price to purchaser's price is only possible for EP services because the components of this adjustment are only collected for EP services. Therefore the EPEA aggregate passing from the supply side to the use side (SUP_NU) only concerns EP services too. SUP_NU is calculated as $P1 - P2_EPS_SP + P7 - P6 + D21-D31$.

Transactions related to the uses of environmental protection products

- The uses of environmental protection by resident units are:
 1. Final consumption of EP services. Households and general government incur final consumption (the latter as collective consumer whenever services produced by government are not sold).
 2. Intermediate consumption of EP services
 3. Capital formation of EP services
 4. Final consumption of EP products other than EP services

The EPEA framework does not require reporting separately each of those categories. In particular the total of 1+2+3 is calculated from the supply side (SUP_NU), including implicitly the value of ancillary output (EP services produced in-house for internal use).

- Item 1 above, i.e., final consumption of EP services (P3_EPS) is required in the mandatory collection. It covers final consumption by households and by government. It is an 'of which' component of the total SUP_NU.
- Item 2 above, i.e. intermediate consumption of EP services (P2_EPS_EXT) is part of the voluntary collection. This is intermediate consumption of EP services for the production of EP services or for other production. This variable allows reporting EP services bought by all producing units of the economy by CEPA. P2_EPS_EXT allows balancing supply and uses of EP services by CEPA. The CEPA breakdown in P2_EPS_EXT has a different meaning than in P2 and P2_EPS. This variable plays a role in the calculation of the contribution of institutional sectors to NEEP, but it is not required for the calculation of the total NEEP, which uses SUP_NU (see section 3).
- Item 3 above, i.e. capital formation of EP services, is not collected in the EPEA framework. It is implicitly included in the total SUP_NU coming from the supply side.

Capital formation of EP services may be different from zero because of construction-related services (e.g. architecture), some R&D services and decommissioning services are capitalised, i.e. become part of GFCF.

- Item 4 above, i.e., the final consumption in EP products other than EP services (specific goods and cleaner goods) is only captured in the voluntary part of the data collection (P3_ACP). Because the aggregate SUP_NU passing from the supply to the use side only encompasses specific EP services, the uses of EP products other than EP services should be added in the use side. The EPEA framework collects final consumption by households for those products. There is no final consumption by government on those goods. P3_ACP seems to be around 20% – 30% of the final consumption of EP services by households.⁽³¹⁾

Because this information is not mandatory, it is not included in the calculation of NEEP in order not to jeopardise comparability across countries.

- Finally, note that the capital formation for the production of EP services, which is an item related to the production of EP services and was introduced above under the 1st category of transactions, is also part of the NEEP. For this reason the GFCF for the production of EP services and acquisitions less disposals of non-produced, non-financial assets for the production of EP services (P51G_NP) are added to NEEP (see line 9 in Table 3).

Environmental protection transfers

- Environmental protection transfers are unrequited payments that contribute to the financing of environmental protection. These are in particular subsidies, which lower the prices paid by the purchasers of environmental protection products and environmental protection transfers to/from the rest of the world. Operationally, environmental protection transfers are transfers

⁽³¹⁾ Average estimates based on the latest voluntary transmissions of these variables

as defined in national accounts that have an EP purpose according to CEPA.

- EPEA only records environmental protection transfers to the extent they are not already captured as expenditure on environmental protection products or expenditure related to the production of environmental protection products, including the gross capital formation. This is to avoid double-counting. The EP transfers without a counterpart seem to be very small, in general less than 1% of total environmental protection expenditure.
- In every transfer there is a payer and a recipient side. For simplicity, EPEA does not take account of both sides at the same time. This means a full analysis of who pays whom across the resident institutional sectors is not required. Instead in its mandatory part EPEA considers the main groups of transfers, namely: those to/from government sector (D3_D7_D92_D99_PAY_GG, D3_D7_D92_D99_REC_GG), those to/from the rest of the world (D3_D7_D92_D99_PAY_RW, D3_D7_D92_D99_REC_RW), those received by corporations (D3_D7_D92_D99_REC_CORP) and received by households (D3_D7_D92_D99_REC_HH).
- The voluntary part of the collection further distinguishes between current and capital transfers to/from the government, corporations and rest of the world (D3_D7_REC_GG, D92_D99_REC_GG, D3_D7_REC_CORP, D92_D99_REC_CORP, D3_D7_REC_RW and D92_D99_REC_RW).
- Only the transfers from/to the rest of the world are used to calculate NEEP. The transfers between the resident sectors do not have a net impact on the position with the rest of the world.
- Finally, the voluntary part of EPEA also collects as supplementary information some transfers called 'earmarked taxes' paid by corporations (TAX_EM_PAY_CORP) and households (TAX_EM_PAY_HH) to the government, which in turn the government uses to finance subsidies on EP services or investment grants for environmental protection capital formation. They are useful information to calculate the total environmental burden in a sector.

3.2. EPEA characteristics

This section presents in a formal, systematic way the characteristics to be reported under Regulation (EU) No 691/2011 and on voluntary basis (see Annex 2 for a complete list). The codes for EPEA are aligned to the ESA 2010 codes (see ESA 2010 Chapter 23).

3.2.1. Mandatory reporting

The characteristics reported under Regulation (EU) No 691/2011 are grouped into four categories, as follows:

- Transactions related to the production of (specific) EP services;
- Transactions related to the transition from *production* of environmental protection services by resident units to *uses* of environmental protection services by resident units. This includes, imports, exports and valuation adjustments from basic price to purchaser's price;
- Transactions related to the uses of EP services;
- Environmental protection transfers that are not already reflected in the expenditure recorded under the uses of EP services and gross capital formation.

PRODUCTION OF ENVIRONMENTAL PROTECTION SERVICES

As explained in section 3.1, the first category concerns the output of EP services or transactions

related to the production of EP services.

P1: output of EP services

Output (P.1) is defined in ESA 2010 as the total of products created during the accounting period (ESA2010 § 3.14).

P1 in EPEA measures output of EP services. This is the sum of market output (including output for own final use), non-market output and ancillary output.

It is worth noting that national accounts define ancillary activities but does not separately record their output. Instead, EPEA measure and separately record ancillary output. Two measures of ancillary output are distinguished on the basis of the valuation method used: the 'simplified valuation legally acceptable' method described later in this section and the 'ESA compatible valuation' described in 3.2.2.

P11: market output of EP services

In ESA 2010 market output (P.11) consists of output that is disposed of on the market or intended to be disposed of on the market (ESA 2010, § 3.17). It includes in particular products sold at economically significant prices, i.e., prices that have a substantial effect on the amounts of products that producers are willing to supply and on the amounts of products that purchasers wish to acquire.

P11 is typically produced by market producers e.g. corporations operating for profit but it may also be secondary output from non-market producers e.g. units in the government sector.

Market output is valued at basic prices. The basic price is the price receivable by the producers from the purchaser for a unit of a good or service produced as output minus any tax payable on that unit as a consequence of its production or sale (i.e. taxes on products), plus any subsidy receivable on that unit as a consequence of its production or sale (i.e. subsidies on products).

In EPEA, the output for own final use is reported under P11 together with the market output (in questionnaire Table 2), for simplicity. Output produced for own final use consists of goods or services that are retained either for own final consumption or for capital formation by the same institutional unit (ESA 2010, § 3.20). Output for own final use is only produced by households. Output produced for own final use is different from ancillary output, which is intended for use within an enterprise as intermediate consumption.

Output for own final use is valued at the basic prices of similar products sold on the market. If basic prices of similar products are not available, output for own-final use should be valued at the costs of production plus a mark-up (except for non-market producers) for net operating surplus or mixed income.

P13: non-market output of EP services

In ESA 2010 non-market output (P.13) is output provided to other units for free, or at prices that are not economically significant, i.e. prices that cover less than 50% of the production costs (ESA 2010, § 3.23).

P13 may be produced by non-market producers or by market producers (in the latter case it will not be the major part of their output). EPEA P13 records the non-market output of EP services of the general government and NPISHs units. In the case of secondary market output by non-market producers, non-market output is valued as a residual item, i.e. as the total costs of production minus revenues from market output.

P13 is subdivided into two items: "Payments for non-market output" (P.131), which consists of various fees and charges paid by the users, and "Non-market output, other" (P.132), which is output provided for free.

Non-market output is valued at the total costs of production (ESA 2010, § 3.49), i.e. the sum of:

- Intermediate consumption;
- Compensation of employees;

- Consumption of fixed capital;
- Other taxes on production less other subsidies on production.

P1_ANC: ancillary EP output (simplified valuation legally acceptable)

Ancillary EP output is a special case of ancillary output. Ancillary output is the output of ancillary activities (ESA 2010, § 3.12), i.e. output intended for use for production activities within an enterprise in order to create the conditions within which the principal or secondary activities can be carried out. Ancillary output differs from output for own final use in that the former is used as input for production whereas the latter is for final use only (final consumption or capital formation).

Ancillary EP output includes the use of energy, material, maintenance and own personnel for so-called “in-house” measures to protect the environment. A large part of internal expenditure is related to operating environmental protection equipment. There are also other internal expenditure such as general administration, education, information, environmental management and certification, research and development.

In ESA 2010 ancillary output is not separately recorded and the costs of undertaking the activity are assumed to be part of the overall costs of producing the primary or secondary output of the establishment (ESA 2010, § 1.31). However, for the purpose of EPEA, as for other satellite accounts (see e.g. ESA § 22.29), given the need to provide a complete picture of EP activities and to report on all environmental protection products, ancillary output should be separately recorded whenever possible. Separate identification allows not only for a comprehensive coverage of production of environmental protection services but also for analysis of changes in the extent of outsourcing of these activities to other establishments compared with activities undertaken “in-house”.

In SEEA-CF, the ancillary output is valued as the sum of intermediate consumption, compensation of employees, other taxes less subsidies on production and consumption of fixed capital (SEEA-CF § 4.59 for more details). This is the ideal valuation method (see characteristic P1_ANC_ESA below)

Regulation (EU) No 691/2011 allows for a simpler valuation method than SEEA-CF. Correspondingly, the characteristic P1_ANC is the ancillary output valued as the sum of the components: “compensation of employees” and “intermediate consumption (excluding environmental protection services)” for the ancillary EP activities.

This characteristic is mandatory for ancillary EP producers (EPEA questionnaire Table 3) and voluntary for EP producers in the general government (EPEA Table 1) and for specialist producers in the corporation sector (EPEA 2).

P2_EPS_SP: intermediate consumption of environmental protection services by specialist producers (for the production of environmental protection services)

According to ESA 2010 (ESA 2010, § 3.88) intermediate consumption (P.2) consists of goods and services consumed as inputs by a process of production, excluding fixed assets whose consumption is recorded as consumption of fixed capital. The goods and services are either transformed or used up by the production process. Intermediate consumption is to be valued at purchaser's prices.

In EPEA, characteristic P2_EPS_SP consists of EP services consumed by specialist producers of EP services as inputs in the process of production of EP services.

P2_EPS_SP is needed to prevent double counting in the calculation of national expenditure on environmental protection. The intermediate consumption of EP services by specialist producers is also included in the expenditure of other units purchasing EP services from specialist producers, i.e. the sum of the uses of EP services. If P2_EPS_SP was not excluded there would be double counting in the aggregate national expenditure on environmental protection (SEEA-CF § 4.82).

P51G_NP: gross fixed capital formation and net acquisitions of non-produced non-financial assets for the production of environmental protection services

According to ESA 2010 (§ 3.124), gross fixed capital formation (P.51g) consists of resident producers' acquisitions less disposals of fixed assets during a given period plus certain additions to

the value of non-produced assets realised by the productive activity of producer or institutional units. Fixed assets are produced assets used in production for more than one year.

Net acquisitions of non-produced non-financial assets correspond to the acquisitions by resident producers, less disposals, of non-produced non-financial assets, i.e., assets that have not been produced within the production boundary and that may be used in the production of goods and services (ESA 2010, § 3.184). The main example relevant for EPEA is land.

EPEA reports them together for simplicity. The EPEA characteristic P51G_NP is the sum of gross fixed capital formation and net acquisitions of non-produced non-financial assets for the production of environmental protection services. This characteristic is to be filled in for general government and corporations as producers of EP services.

Some environmental protection services may be capitalized and enter the gross fixed capital formation; this is in particular the case for the production of R&D on EP or land and sites remediation services like decommissioning costs of nuclear power stations or oil rigs or the cleanup costs of landfill sites. ESA § 3.127 subparagraph 7 notes however that "Expenditure on R&D will only be treated as fixed capital formation when a high level of reliability and comparability of the estimates by the Member States has been achieved". According to ESA § 3.129 subparagraph h gross fixed capital formation includes terminal costs, i.e. large costs associated with disposal, e.g. decommissioning costs of nuclear power stations or clean-up costs of landfill sites.

Whenever EP services like land and sites remediation services (decommissioning costs of nuclear power stations or oil rigs or the clean-up costs of landfill sites) are recorded as gross fixed capital formation (generally in CEPA 4), they are "written off" in the same year by consumption of fixed capital. See ESA § 3.139: "Consumption of fixed capital covers anticipated terminal costs, such as the decommissioning costs of nuclear power stations or oil rigs or the clean-up costs of landfill sites. Such terminal costs are recorded as consumption of fixed capital at the end of the service life, when the terminal costs are recorded as gross fixed capital formation".

This consumption of fixed capital should in theory be recorded in EPEA as ancillary output. However as P1_ANC does not include consumption of fixed capital it would only be recorded as P1_ANC_ESA (see below).

TRANSITION FROM OUTPUT AT BASIC PRICES TO SUPPLY AVAILABLE TO RESIDENT USERS AT PURCHASER'S PRICES

The accounts are balanced by construction, in such a way that total supply must equal total demand. However this balancing stands only if supply and demand have the same scope and are valued in identical way. In order to ensure it, this second category of transactions concerns the two types of adjustment items:

- For the transition from *output* of EP services by resident units to *uses* of EP services by resident units. This means imports and exports
- For the transition from output of EP services *at basic price* ⁽³²⁾ to uses *at purchaser's price*. ESA (§ 3.06) defines purchaser's price as the price the purchaser pays for the product. It includes in particular taxes less subsidies on the products (but excluding deductible taxes like VAT on the products)

Purchaser's price = basic price + taxes on products less subsidies on products + trade and transport margins

Note that for (EP) services, trade and transports margins do not exist.

P6: exports of environmental protection services and P7: imports of environmental protection services

ESA 2010 (§§ 3.156 & 3.157) defines exports (P.6) and imports (P.7) respectively as transactions in goods and services (sales, barter, and gifts) from residents to non-residents and as transactions in

⁽³²⁾ Non-market output valuation at sum of costs is a proxy of non-observable basic price

goods and services (purchases, barter, and gifts) from non-residents to residents. According to ESA § 3.177, imports of services are valued at purchaser's prices and exports of services at basic prices. This is also the valuation rule applied in EPEA.⁽³³⁾

In EPEA, P6 is the value of EP services produced in the national economy and sold to non-resident units and P7 is the value of EP services produced in the rest of the world and purchased by resident units. These characteristics mainly concern EP services in CEPA 2 (waste water collection and treatment), CEPA 3 (waste collection and treatment) and CEPA 4 (Protection and remediation of soil, groundwater and surface water). Whereas imports and exports of sewerage services (CEPA 2) are generally insignificant this may not be the case of waste treatment or remediation services (CEPA 3 and CEPA 4), e.g. when hazardous waste are sent to other countries or imported from other countries for treatment or disposal or when decontamination services are purchased from or sold to non-resident units.

D21-D31: VAT and other taxes less subsidies on environmental protection services

ESA 2010 (§ 4.16) defines taxes on products (D.21) as taxes that are payable per unit of a given good or service produced or transacted. The tax may be a specific amount of money per unit of quantity of a good or service, or it may be calculated as a specified percentage of the price per unit or value of the goods and services produced or transacted. Taxes on products include in particular value added type taxes (VAT) i.e. taxes on goods or services collected in stages by enterprises and which are ultimately charged in full to the final purchaser. When assessing VAT and other taxes only non-deductible VAT and other taxes should be taken into account.

Taxes on products (D.21) should not be confused with other taxes on production (D.29). The latter are independent of the quantity or value of the products produced or sold. Except for VAT, most of the taxes collected in relation to EP services are other taxes on production (D.29). See characteristic D29-D39 below.

ESA 2010 (§ 4.31) defines subsidies on products (D.31) as subsidies, i.e., current unrequited payments which general government or the institutions of the European Union make to resident producers, payable per unit of a good or service produced or imported.

In EPEA, characteristic D21-D31 is the balance of taxes less subsidies payable or receivable on EP services. In order to make the transition from basic price to purchaser's price, the various taxes on EP services are added and the subsidies on EP services deducted.

It may be worth noting that the concepts of 'taxes' and 'subsidies' in national accounts do not correspond to the common use of these terms. Not all unrequited payments to the government sector are called 'taxes' in national accounts.⁽³⁴⁾ There is one type of taxes on production, namely taxes on products (D.21) which the producer charges to the purchaser and passes on to government. Therefore D.21 are part of the price paid by the purchaser but not of the price set by the producer in terms of its own production costs and profit making (i.e. the basic price). The same applies to subsidies on products (D.31).

SUP_NU: environmental protection services supply at purchaser's price available to resident users

This characteristic corresponds to the total supply of EP services at purchaser's prices available to resident users less intermediate consumption of EP services by specialist producers. It equals the total uses of EP services in the economy except the uses as intermediate consumption of EP services by specialist producers.

It is calculated on the basis of other EPEA characteristics as output (P1) plus imports (P7), minus

⁽³³⁾ In general, exports are valued 'free on board' (FOB, see ESA § 3.168). As the exports in the EPEA framework only concern services (EP services), they are valued at basic prices plus taxes less subsidies on products

⁽³⁴⁾ Actually payments to the government sector may correspond to three broad types of flows: payments for a service (e.g. garbage collection); taxes on production (D.2); and other distributive transactions including current taxes on income, wealth, etc. (D.5), social contributions and benefits (D.6), other current transfers (D.7), capital transfers (D.9) and other distributive transactions (D.4 and D.8)

exports (P6) plus VAT and other taxes less subsidies on products (D21-D31) less intermediate consumption of EP services by specialist producers (P2_EPS_SP).

SUP_NU is only defined at the level of total CEPAs, no matter that the characteristics from which it is derived also exist at individual CEPA level.

USES OF ENVIRONMENTAL PROTECTION PRODUCTS

The third category of transactions concerns the uses of EP products by resident units. The mandatory part of the reporting framework only asks for final consumption of characteristic EP services.

P3_EPS: final consumption of environmental protection services

According to ESA 2010 (§ 3.94) final consumption expenditure (P.3) consists of expenditure incurred by resident institutional units on goods or services that are used for the direct satisfaction of individual needs or wants or the collective needs of members of the community.

Final consumption of EP services by households (ESA 2010, § 3.95) consists of expenditure incurred by households on the purchases of EP services. This is consumption to satisfy their individual needs. It includes households' "payments for non-market output" i.e. their payments of various fees and charges that represent less than 50% of the costs of production of the non-market EP services. The final consumption expenditure of households is recorded at purchaser's prices.

In national accounts, the consumption of products for the benefit of the community at large e.g., public administration, justice services, defence services, etc. is conventionally attributed to the general government. This is the final consumption by the general government. Those services are typically produced by the government itself, so they can be identified and measured from the production side.

Correspondingly, final consumption expenditure of EP services by general government and NPISH (ESA 2010, §§ 3.97, 3.98 and 3.117) is equal to the value of their non-market output less payments for non-market output.⁽³⁵⁾

ENVIRONMENTAL PROTECTION TRANSFERS

The fourth category of EPEA characteristics is the environmental protection transfers between units of the various institutional sectors of the economy and with the rest of the world.

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 (ESA 2010, § 1.71).

This definition covers a large number of transactions between the institutional units of the economy and between units of the economy and the rest of the world. EPEA considers a limited set of the transfers flows in ESA 2010. For the purposes of EPEA, only the following transfers are considered:

- Current transfers. They directly affect the level of disposable income and are all transfers that are not transfers of capital. They can be in kind or in cash and consist of subsidies (D3) and other current transfers (D7);⁽³⁶⁾
- Capital transfers (D9). They are transfers linked to the acquisition (or disposal) of fixed assets and they can be in cash or in kind. Capital transfers redistribute saving or wealth. Capital transfers include investment grants (D92) and other capital transfers (D99).

(it is noted that ESA2010 considers the compensation of employees (D1) as a current transfer, i.e., a

⁽³⁵⁾ ESA 2010 also adds the government supply of products to households, without any transformation, as social transfers in kind (ESA 2010, § 4.109). They do not have any environmental protection component and thus are out of EPEA scope

⁽³⁶⁾ Outside the scope of EPEA but included in ESA 2010 are the social contributions and benefits (D6). They do not have any environmental protection component

distribution of the value added generated during production to labour. However EPEA considers it directly associated to the production activity, see D.1 in the voluntary reporting below).

Environmental protection transfers are all current or capital transfers intended to support environmental protection activities and actions. They cover transfers in favour of the production and use of environmental protection products (whether EP services or not).⁽³⁷⁾

The national accounts distinction between current and capital transfers is not always of main importance for EPEA and for this reason they are not distinguished in the mandatory collection. However they can be reported separately in the voluntary data collection.

It is noted that the consolidation principle for the general government sector in EPEA is different from national accounts. Consolidation is an accounting principle by which transfers between units in the same institutional sector are not reported in the accounts. Whereas in general in national accounts and in particular in public finance statistics transfers are not consolidated, in EPEA the transfers are consolidated for general government and NPISH. This means that EP transfers between general government units, and in particular between units in different levels of the government sector (central, regional, local), or between general government and NPISH, are not recorded in EPEA.

The following transfers are recorded in the mandatory part of the EPEA reporting framework:

D3_D7_D92_D99_PAY_GG: general government: transfers paid

This characteristic corresponds to the current and capital environmental protection transfers paid by the general government (and NPISH) to other institutional sectors and the rest of the world. It mainly consists of subsidies to producers of EP services, including for ancillary activities, investments grants to corporations and households, and international cooperation in the field of environmental protection.

D3_D7_D92_D99_REC_GG: general government: transfers received from the rest of the world

This characteristic corresponds to the current and capital environmental protection transfers received by the general government (and NPISH) from the rest of the world. For European countries it mainly consists of grants for environmental protection investment received by the general government from EU institutions.

D3_D7_D92_D99_REC_CORP: corporations: transfers received from general government and the rest of the world

This characteristic corresponds to the current and capital environmental protection transfers received by corporations from the general government (and NPISH) and the rest of the world. They may consist of subsidies on the production of EP services, investment grants for the acquisition of produced fixed assets or non-produced non-financial assets.

D3_D7_D92_D99_REC_HH: households: transfers received from general government and the rest of the world

This characteristic corresponds to the current and capital environmental protection transfers received by households from the general government (and NPISH) and the rest of the world.

In ESA 2010 subsidies are always paid to producers. Households do not directly receive subsidies although they may indirectly benefit, when the subsidy reduces the purchaser's price for EP services.

Examples of capital transfers are grants to households for the improvement of dwellings for environmental protection purpose (e.g. noise insulation).

D3_D7_D92_D99_PAY_RW: rest of the world: transfers paid

This characteristic corresponds to the current and capital environmental protection transfers paid by the rest of the world to households, corporations and general government. They may consist of

⁽³⁷⁾ See [Environmental subsidies and similar transfers - Guidelines – Eurostat 2015](#)

investment grants and of current transfers for environmental protection purpose paid by the European institutions (DG environment).

D3_D7_D92_D99_REC_RW: rest of the world: transfers received from general government

This characteristic corresponds to the current and capital environmental protection transfers paid by the general government to the rest of the world: current international cooperation and investment grants in the field of environmental protection.

3.2.2. Voluntary reporting

The voluntary EPEA reporting adds to the characteristics mandatory under Regulation (EU) No 691/2011 some supplementary characteristics which are presented below. They may be grouped into three categories:

- Transactions related to the production of EP products;
- Transactions related to the uses of environmental protection products;
- Environmental protection transfers.

PRODUCTION OF ENVIRONMENTAL PROTECTION PRODUCTS

P2: intermediate consumption for the production of environmental protection services

P2 corresponds to the value of products consumed as intermediate consumption for the production of EP services.

Intermediate consumption for the production of EP services is divided into two categories: **P2_EPS** and **P2_NEPS**.

P2_EPS: intermediate consumption of environmental protection services for the production of environmental protection services

P2_EPS is the value of all EP services consumed as inputs for the production of EP services. This characteristic is asked for all categories of producers of EP services. This characteristic is an extension of the mandatory characteristic P2_EPS_SP to producers of EP services other than specialist producers of the corporations sector.

P2_NEPS: intermediate consumption (excluding environmental protection services) for the production of environmental protection services

P2_NEPS is the value of products, excepted EP services, consumed as inputs for the production of EP services. This characteristic is asked for all categories of producers of EP services.

P2 is the sum of P2_EPS and P2_NEPS.

D1: compensation of employees for the production of environmental protection services

ESA 2010 (§ 4.02) defines compensation of employees (D.1) as the total remuneration, in cash or in kind, payable by an employer to an employee in return for work done by the latter during an accounting period. Components of compensation of employees are: wages and salaries and employers' social contributions.

In EPEA this characteristic corresponds to the total remuneration, in cash or in kind, payable to employees engaged in the production of EP services. It is asked for all categories of producers of EP services.

P1_ANC: ancillary EP output (simplified valuation legally acceptable)

This characteristic is defined as the sum of P2_NEPS and D1.

This characteristic is mandatory for ancillary EP producers (EPEA questionnaire Table 3) and voluntary for EP producers in the general government (EPEA Table 1) and for specialist producers in the corporation sector (EPEA 2).

D29-D39: other taxes less subsidies on production for the production of environmental protection services

ESA 2010 (§ 4.22) defines other taxes on production (D.29) as all taxes that producers incur as a result of engaging in production, independently of the quantity or value of the goods and services produced or sold. Other subsidies on production (D.39) are subsidies, except subsidies on products, which resident producer units may receive as a consequence of engaging in production (ESA 2010, § 4.36).

The EPEA characteristic D29-D39 corresponds to other taxes on production paid less other subsidies on production received by the producers of EP services. The characteristic is asked for all categories of producers of EP services. Other taxes on production include in particular taxes on pollution resulting from production activities e.g. taxes levied on the emission or discharge into the environment of noxious gases, liquids or other harmful substances. Other subsidies on production include in particular subsidies to reduce pollution: these consist of current subsidies intended to cover some or all of the costs of additional processing undertaken to reduce or eliminate the discharge of pollutants into the environment.

P51C: consumption of fixed capital of producers of environmental protection services

According to ESA 2010 (§ 3.139) consumption of fixed capital (P.51C) is the decline in value of fixed assets owned as a result of normal wear and tear and obsolescence. The estimate of decline in value includes a provision for losses of fixed assets as a result of accidental damage which can be insured against. Consumption of fixed capital covers anticipated terminal costs, such as the decommissioning costs of nuclear power stations or oil rigs or the cleanup costs of landfill sites. Such terminal costs are recorded as consumption of fixed capital at the end of the service life, when the terminal costs are recorded as gross fixed capital formation. Consumption of fixed capital is different from the depreciation allowed for tax purposes or the depreciation shown in business accounts

The EPEA characteristic P51C corresponds to the decline in value of the fixed assets engaged in the production of EP services. This characteristic is asked for all categories of producers of EP services.

B2N: net operating surplus of producers of environmental protection services

In ESA 2010, the net operating surplus is the balancing item of the generation of income account, i.e., what remains from the value of output when all other production costs are deducted.⁽³⁸⁾ It represents the 'profits' of the market producers after deduction of their production costs.

In EPEA this characteristic is calculated as $P1 + RNO - P2 - D1 - P51C - (D29-D39)$. As non-market output and ancillary output are valued at the total costs of production for these categories of output the net operating surplus is zero. However the characteristic is also asked for producers of the general government sector because some local KAUs of the general government sector may be market producers.

⁽³⁸⁾ More precisely "Net operating surplus / mixed income" is the balancing item of the generation of income account: in the case of unincorporated enterprises in the households sector, the balancing item of the generation of income account implicitly contains an element corresponding to remuneration for work carried out by the owner or members of the family. This income from self-employment has characteristics of wages and salaries, and characteristics of profit due to work carried out as an entrepreneur. This income, neither strictly wages nor profits alone, is referred to as 'mixed income'. See ESA 2010, § 8.19. Note that in EPEA unincorporated enterprises of the households sector are grouped together with corporations

NEGB2N_GG negative net operating surplus of market producers in the general government sector

When calculating the net operating surplus of those local KAUs of the general government sector which are market producers, it may happen that the result is negative. A negative net operating surplus would indicate that the production costs of EP services are not covered by sales. The institutional unit being a non-market producer needs to cover the loss incurred by its market producer establishment by some transfer. This covering of incurred losses may be regarded as an implicit subsidy from the institutional unit to its dependent establishment. Such implicit subsidy is not recorded in national accounts.

However in EPEA this implicit subsidy is recorded as transfers under the heading "Negative net operating surplus of market producers in the general government sector". This is the only non-consolidated current transfer recorded within the general government sector.

P11_MA: market output of EP services (from principal activity) and P11_SA: market output of EP services (from secondary activities)

These characteristics correspond respectively:

- to the value of output of EP services produced by specialist producers in the corporations sector, i.e. those market producers whose principal activity is the production of EP services;
- to the value of output of EP services produced as secondary output by non-specialist producers in the corporations sector, i.e. those market producers whose principal activity is not the production of EP services.

They are asked only for the specialist producers in the corporation sector.

P1_ANC_ESA: ancillary EP output (ESA compatible valuation)

This EPEA characteristic measures ancillary EP output more accurately than P1_ANC. Whereas P1_ANC values ancillary output as the sum of only intermediate consumption (excluding intermediate consumption of EP services) and compensation of employees, P1_ANC_ESA is compiled as the sum of intermediate consumption (excluding intermediate consumption of EP services), compensation of employees, consumption of fixed capital and other taxes less subsidies on production.

This is asked for only the ancillary EP producers.

RNO: related non-EP output (formerly receipts from by-products)

The production of EP services may generate output of related goods and services different from EP products e.g. energy produced by waste incineration plants. For conceptual completeness, EPEA collects this variable although it is not expected to be big and it may be negligible in certain cases.

Related non-EP output (formerly called 'receipts from by-products' in the JQ-EPER and 'related products' in the SERIEE manual) corresponds to the by-products of characteristic EP activities that have economic value and are not EP products. The production of those by-products cannot be separated from the exercise of EP activities because they are technically linked. Examples of related non-EP output include energy generated or material recovered as a result of waste treatment, sludge as a result of waste water management. RNO are not EP products. Some of this output may be RM products, for example renewable energy.

Because RNO are not EP products, they are not recorded in EPEA as part of other characteristics like P1. Although the borderline with secondary non-environmental output of specialist producers may be fuzzy, the criterion is that the production of the by-product results from the production of the EP service. See also Annex 4 for guidance of some borderline cases.

RNO may either be sold and generate revenues, or be used internally and lead to reductions in costs. RNO are the sum of the sales value and the value of the costs saved using internally the by-products.

RNO is collected for all categories of EP producers. RNO is primarily relevant for specialist producers and much less for secondary and ancillary producers.

EMP: employment (full time equivalents) of producers of EP services

This characteristic is the total employment engaged in the production of EP services.

It is measured in full time equivalents; it comprises employees and self-employed. The full-time equivalents is the number of full-time equivalent jobs, defined as total hours worked divided by average annual hours worked in full-time jobs.

INV_EOP: GFCF on specific EP fixed assets (formerly end-of-pipe technologies) and INV_IT: GFCF on cleaner EP fixed assets (formerly integrated technologies)

GFCF on specific EP fixed assets (formerly called end-of-pipe technologies) are methods, technologies, processes or equipment designed to collect and remove pollution and pollutants (e.g. air emissions, effluents or solid waste) after their creation, prevent the spread of and measure the level of the pollution, and treat and dispose of pollutants generated by the operating activity of the company. Examples are various types of filters, scrubbers, cyclones, centrifuges, etc. to clean the air; equipment in waste-water treatment plants; various materials and measures to reduce noise pollution, etc.

GFCF on cleaner EP fixed assets (formerly called integrated technologies) are new or adaptation of existing methods, technologies, processes, equipment (or parts thereof) designed to prevent or reduce the amount of pollution created at the source (e.g. air emissions, effluents or solid waste), thereby reducing the environmental impacts associated with the release of pollutants and/or with polluting activities. While pollution treatment investments treat pollution already generated, pollution prevention involves changes in production, operating processes, or the raw materials used in order prevent or reduce pollution at the source.

These two concepts are in line with SEEA-CF § 4.72: “for (non-specialist and own-account) producers, two particular types of gross fixed capital formation for environmental protection can be distinguished:

- a) Expenditure on “end-of-pipe” technologies used to treat, handle or dispose of emissions and wastes from production. This type of expenditure is normally easily identified even within the context of own-account activity because it is usually directed towards an “add on” technology which removes, transforms or reduces emissions and discharges at the end of the production process;
- b) Expenditure on “integrated” investments, also called cleaner technologies. These are new or modified production facilities designed to ensure that environmental protection is an integral part of the production process, thereby reducing or eliminating emissions and discharges and thus the need for end-of-pipe equipment.”

GFCF on specific EP fixed assets are valued at purchaser's prices. GFCF on cleaner EP fixed assets are valued at extra costs, similarly to final consumption of cleaner EP goods. This is the extra costs of the modification of existing equipment or on the extra cost due to pollution control, energy savings and the like (i.e., the cost of 'non-polluting or less-polluting' equipment is compared with that of 'polluting or more-polluting' reference equipment). This is in line with SEEA-CF § 4.73.

It is worth noting that if 'cleaner' technologies eventually become the standard or reference technology. At that point there is no longer any identifiable environmental expenditure and their extra cost compared to reference equipment is zero.

INV_EOP and INV_IT are collected for ancillary producers of EP services. They correspond respectively to the SBS environmental characteristics:

21 11 0 Investment in equipment and plants for pollution control, and special antipollution accessories (mainly end-of-pipe equipment)

21 12 0 Investment in equipment and plant linked to cleaner technology (“integrated technology”)

More details about the definitions of those SBS characteristics are found in section 4.2.2. More guidance on the identification of EP investments, taking into account also the relative efficiency of EP and non-EP equipment, is given in the Eurostat *Environmental expenditure statistics: industry data collection handbook*, pgs 22-30.⁽³⁹⁾

USES OF ENVIRONMENTAL PROTECTION PRODUCTS

P2_EPS_EXT: intermediate consumption of environmental protection services (for production of environmental protection services and for other production)

P2_EPS_EXT is the intermediate consumption of EP services. This may be consumed by producers of EP services or by other producers.

The variable P2_EPS_EXT is implicitly part of the uses of EP services, but it is not explicitly needed to calculate NEEP because it is part of SU_NU. Instead the role of P2_EPS_EXT is to balance supply and uses of EP services by CEPA.

It is important to distinguish P2_EPS_EXT from intermediate consumption of EP services for production of EP services (P2_EPS). The breakdown by CEPA classes of P2_EPS_EXT and P2_EPS has different meaning. The CEPA code in P2_EPS indicates the activity of the producer. For example, P2_EPS in CEPA 2 is the intermediate consumption of all EP services (CEPA 1, CEPA 2...CEPA 9 EP services) for the production of CEPA 2 services. Instead the CEPA code in P2_EPS_EXT indicates the product used for intermediate consumption. For example, P2_EPS_EXT in CEPA 2 is the total intermediate consumption in CEPA 2, either for the production of EP services or for other production.

P3_ACP: final consumption of EP products other than EP services

This corresponds to the household final consumption expenditure of EP products other than EP services i.e., specific EP goods (=connected goods) and cleaner EP goods (=adapted products). Final consumption of specific goods is valued at purchaser's prices and final consumption of cleaner goods is valued at extra cost (see 5.5.2.1)

ENVIRONMENTAL PROTECTION TRANSFERS

D3_D7_REC_GG: current environmental protection transfers received by general government units from the rest of the world and D92_D99_REC_GG: capital environmental protection transfers received by general government units from the rest of the world

These characteristics break down the mandatory characteristic "general government transfers received from the rest of the world": D3_D7_D92_D99_REC_GG into current and capital transfers.

D3_D7_REC_CORP: corporations: current environmental protection transfers received from the general government and the rest of the world and D92_D99_REC_CORP: corporations: capital environmental protection transfers received from the general government and the rest of the world

These characteristics break down the mandatory characteristic D3_D7_D92_D99_REC_CORP: "Corporations: transfers received by corporations from the general government and the rest of the world" into current and capital transfers.

Earmarked taxes

Some taxes may be recorded where a direct link exists between the tax revenue collected and expenditure on particular projects for environmental protection. These are "earmarked" taxes for

⁽³⁹⁾ <http://ec.europa.eu/eurostat/documents/1798247/6191545/4-Industry-data-collection-handbook-2005.pdf/b0d76b67-123a-4898-8243-85474e30e436>

environmental i.e. they are used to finance subsidies on EP services or investment grants for environmental protection capital formation (SEEA-CF § 4.89).

EPEA considers these taxes as environmental transfers paid by the users of the EP services (households or corporations) to the general government. Only the part effectively used for the financing of transfers by the general government is to be reported.

TAX_EM_PAY_CORP: corporations: earmarked taxes paid

This characteristic corresponds to the payment by corporations of taxes whose revenues are earmarked for financing environmental protection measures. Payments of general environmental or green taxes (such as energy taxes) where the revenues are not ear-marked for financing environmental protection measures are excluded.

TAX_EM_PAY_HH: households: earmarked taxes paid

This characteristic corresponds to the payment by households of taxes whose revenues are earmarked for financing environmental protection measures.

D3_D7_REC_RW: Rest of the World: current transfers received from general government and D92_D99_REC_RW: Rest of the World: capital transfers received from general government

These characteristics break down the mandatory characteristic: D3_D7_D92_D99_REC_RW "Rest of the world transfers received from the general government" into current and capital transfers.

3.3. Eurostat EPEA questionnaire

Eurostat has defined, in close cooperation with the Member States, the EPEA questionnaire implementing Regulation (EU) No 691/2011, Annex IV. In technical terms the questionnaire is a set of spreadsheets in a workbook. The questionnaire consists of 7 tables, some of them with sub-tables, as shown in Table 4.

Table 4: Structure of the EPEA data collection questionnaire

Spreadsheet name	Description
1 – General Government and NPISH	Output of EP services and GFCF and net acquisitions of non-produced non-financial assets for environmental protection activities (P51G_NP) by general government and NPISH units
2 – Corporations as market producers of EP services	Output of market EP services and P51G_NP by corporations units (specialist and secondary producers)
3 – Corporations other	Output of EP services and corresponding P51G_NP by corporations units as ancillary producers
3a, 3b, 3b_Add, 3c, 3d and 3e –Corporations other	Breakdown of Table 3 for NACE B, C, D, E36 and other NACE; Table 3b_Add breaks down Table 3b for NACE C divisions
4 –Total supply	Summary of EP services output, imports and exports of EP services; calculation of EP services at purchasers' prices available for national uses
5 - Households	Final consumption of EP services by households
6 - Transfers	Transfers for environmental protection received and paid by the units of the various institutional sectors
7.1 – Total economy by CEPA	Summary of transactions related to EP services for the various CEPA classes
7.2 – Total CEPA by sectors	Summary of transactions related to EP services for the various sectors of the economy and the rest of the world
7.3 – Total economy total CEPA	National expenditure for environmental protection

Tables (spreadsheets) 1 to 6 have two separates parts: One for reporting the mandatory characteristics under Regulation (EU) No 691/2011 and one for reporting the voluntary data. Table 7 summarises results from the other tables in the questionnaire.

Tables (spreadsheets) 1, 2, 3 and 5 are structured by institutional sector, as follows:

- Table 1: general government and NPISH units as producers and users of EP services. All producer units in GG and NPISH are reported together in Table 1 irrespective of whether they operate as principal EP producers, secondary EP producers or ancillary EP producers
- Table 2: corporations as producers of market EP services (specialist EP producers and secondary EP producers)
- Table 3: corporations as ancillary producers of EP services and users of EP products
- Table 5: households

Indeed, it is expected that an approach by institutional sector plays an important role in the estimation approach, and indeed Chapter 5 follows such approach. In addition, Tables 3a, 3b, 3b_Add, 3c, 3d, 3e request breakdowns by industry (NACE). This breakdown is requested because it is easily available from Structural Business Statistics.

In particular, Table 1 reports the units classified in the government sector and NPISH units.⁽⁴⁰⁾ They are non-market producers. Some of those units may have secondary market output. Some care is needed when completing the Tables 1 (General government) and 2 (Corporations as secondary and specialist producers) to make sure that the data for all units belonging to the institutional sector general government are recorded in Table 1 and the data recorded in Table 2 (corporations) are only those for units that belong to the corporations institutional sector. In countries where the national accounts data by industries and the supply and use tables are not based on institutional units but on the more detailed local kind-of-activity units (KAUs), it is possible that some units (local KAUs) belonging to the general government institutional sector engaged in environmental protection

⁽⁴⁰⁾ In the following 'General Government' denotes the grouping of General Government and NPISH institutional sectors

activities are classified in NACE Rev. 2 divisions 37, 38.1, 38.2 or 39.

Double reporting is to be avoided, in particular between Tables 1, 2 and 3a-e.

In the following, the codes of the characteristics presented in section 3.2 are supplemented with a number indicating the questionnaire table (spreadsheet) to which they refer. For example, P11.1 refers to market output (P11) for general government and NPISH (Table 1), P11.2 to market output for Corporations as market producers of EP services (Table 2) and P11.4 refers to total market output (Table 4). This naming convention will be used in the rest of this handbook.

3.3.1. Mandatory part of the tables

EPEA questionnaire Tables 1, 2 and 3 present respectively the variables for:

- general government and NPISH units
- corporations as producers of market EP services (specialist producers and secondary producers) and
- corporations as ancillary producers and users of EP services.

In particular, the mandatory part of these tables collects the respective EP output (i.e., EP services) and the gross fixed capital formation and acquisitions less disposals of non-produced non-financial assets for the production of EP services (P51G_NP).

In addition, Table 1 collects as the final consumption of non-market EP services by the general government (P3_EPS.1). This variable does not exist for corporations.

In addition, Table 2 collects the intermediate consumption of EP services by corporations as specialist producers of EP services (P2_EPS_SP.2).

EPEA Table 4 collects the total supply of EP services available for resident units, at purchaser's prices. This is calculated by adding to output at basic prices (from previous tables) the imports of EP services and the VAT and other taxes less subsidies on EP services. Table 4 also collects exports and the intermediate consumption of EP services by specialist producers, as elements to be subtracted for the calculation of national environmental protection expenditure (see section 3.4). Part of Table 4 is automatically filled in with data from previous Tables 1, 2 and 3.

Note that the automatic filling is based on the data from the mandatory part of the tables eventually complemented with data from the voluntary part of the tables when the mandatory data do not provide a full CEPA coverage, which is the case of the mandatory part of Table 2.

EPEA Table 5 collects the final consumption of EP services by households (P3_EPS.5). For households, the variables related to production activities do not exist (household's output for own final use, if any, is reported alongside the market output in Table 2 or Table 3).

EPEA Table 6 collects the total transfers for EP paid and received by the various institutional sectors of the national economy and the rest of the world.

EPEA Tables 7.1, 7.2 and 7.3 summarise the main transactions related to environmental protection by CEPA (Table 7.1) and institutional sectors (Tables 7.2 and 7.3). These tables are filled-in automatically with data from the previous tables 1 to 6. Table 7.3 has two parts: one that automatically calculates the national expenditure on environmental protection from the information provided in Tables 1 to 6 and the other that allows countries to provide their own estimate of NEEP if they want to do so. Countries can explain the differences between both calculations in the footnotes.

The CEPA and NACE classifications in the mandatory reporting

The breakdown of data by CEPA in the mandatory part of the reporting are closely related with the availability of data in the European Statistical System (see Chapter 4).

Table 5: CEPA breakdowns for mandatory reporting

CEPA / Table	Table 1	Table 2	Table 3	Table 4	Table 5	Table 6	Table 7.1
CEPA 1			x				
CEPA 2	x	x	x	x	x	x	x
CEPA 3	x	x	x	x	x	x	x
CEPA 4		x					
CEPA 5							
CEPA 6	x					x	
CEPA 7							
CEPA 8							
CEPA 9							
Sum of CEPAs 1, 4, 5, 7	x					x	
Sum of CEPAs 8, 9	x					x	
Sum of CEPAs 4, 5, 6, 7, 8, 9			x				
Sum of CEPAs 1, 4, 5, 6, 7, 8, 9				x			x

Tables 7.2 and 7.3 collect data for all CEPA by institutional sector (general government and NPISH, corporations, households and rest of the world).

NACE breakdowns are reported in EPEA Table 3 (corporations: other) complemented by six tables corresponding to corporations classified in NACE B (Table 3a), NACE C total (Table 3b), NACE C details (Table 3b_Add), NACE D (Table 3c), NACE E36 (Table 3d) and other NACE (Table 3e). This last table is voluntary.

EPEA Table 3b_Add collects data according to the NACE divisions or grouping of divisions indicated in Table 6.

Table 6: NACE for the mandatory reporting of corporations other (also covering producers of ancillary EP services: manufacturing

NACE	Activity
10-12	Food, beverages and tobacco products
13-15	Textiles, wearing apparel, leather and related products
16	Wood, wood products, except furniture; articles of straw and plaiting articles
17	Paper and paper products
18	Printing and reproduction of recorded media
19	Coke plants and refined petroleum products
20	Chemicals and chemical products
21	Pharmaceutical products and pharmaceutical preparations
22	Rubber and plastic products
23	Other non-metallic mineral products
24	Basic metals
25	Fabricated metal products, except machinery and equipment
26	Computer, electronic and optical products
27	Electrical equipment
28	Machinery and equipment n.e.c.
29	Motor vehicles, trailers and semi-trailers
30	Other transport equipment
31-32	Furniture and other manufacturing
33	Repair and installation of machinery and equipment

Figure 6 summarizes the structure of the tables for mandatory reporting and the characteristics to be reported by institutional sectors and CEPA.

Figure 6: Tables for mandatory reporting

sheet/table	1	2	3	4	5	6	7.1	7.2
Sector	General government	Corporations as EPS market producers	Corporations: other (also covering producers of ancillary EPS)	Total supply	Households	(transfers)	Total economy	General government, Corporations, Households, Rest of the world
CEPA	2, 3, 6, sum (1,4,5,7), sum (8,9)	2, 3, 4	1, 2, 3, sum (4,5,6,7,8,9)	2, 3, sum (1,4,5,6,7,8,9)	2, 3	2, 3, 6, sum (1,4,5,7), sum (8,9)	2, 3, sum (1,4,5,6,7,8,9), Total	Total CEPA
(P1) EP output	X							
(P11) EP market output	X	X						
(P13) EP non-market output	X							
(P1_ANC) ancillary EP output legally acceptable			X					
(P7) Imports of EP services				X				
(P6) Exports of EP services				X				
(D21-D31) VAT and other taxes less subsidies on EP services				X				
(P2_EPS_SP) Intermediate consumption of EP services by specialist producers *)		X		X				
(SUP_NU) EP services supply at purchasers' prices available for national uses								
(P51G_NP) Gross fixed capital formation **)	X	X	X					
(P3_EPS) Final consumption of EP services	X				X			
(D3_D7_D92_D99_PAY_GG) General government: total transfers paid						X		
(D3_D7_D92_D99_REC_GG) General government: transfers received from RW ***)						X		
(D3_D7_D92_D99_REC_CORP) Corp.: transfers received from GG and RW ***)						X		
(D3_D7_D92_D99_REC_HH) Households: transfers received from GG and RW ***)						X		
(D3_D7_D92_D99_REC_RW) Rest of the world: transfers received from GG ***)						X		
(D3_D7_D92_D99_REC_RW) Rest of the world: transfers received from GG ***)						X		
(D3_D7_D92_D99_PAY) Current and capital transfers paid								
(D3_D7_D92_D99_REC) Current and capital transfers received								

*) specialised producers in the corporation sector

***) and acquisitions less disposals of non-produced non-financial assets

***) GG: general government; RW: rest of the world

3.3.2. Voluntary part of the tables

The voluntary part of the questionnaire collects data according to a full breakdown by CEPA classes and additional characteristics, in particular regarding the description of production costs and inputs.

This organisation of the questionnaire means that the additional voluntary characteristics are only asked with full CEPA detail instead of the groupings asked for the mandatory variables.

BREAKDOWNS BY INDIVIDUAL CEPA DOMAINS

Whereas the mandatory reporting collects data only for the most important domains (for which data are almost readily available in sources – see Chapter 4) with the other domains grouped or left aside, the voluntary reporting collects individual data for all domains and even for “climate change” within CEPA 1 (protection of ambient air and climate).

The table below indicates which CEPA classes data are collected in the voluntary parts of the reporting tables. Note that there is no voluntary part in EPEA Tables 7.1, 7.2 and that 7.3 is only voluntary.

Table 7: CEPA breakdown for voluntary reporting

CEPA / Tables	Tables 1 to 6
CEPA 1	X
of which CEPA 1.1.2 + CEPA 1.2.2	X
CEPA 2	X
CEPA 3	X
CEPA 4	X
CEPA 5	X
CEPA 7	X
CEPA 6	X
CEPA 8	X
CEPA 9	X

In the voluntary reporting part, it is recommended to report the characteristics broken down by CEPA classes whenever possible. If such breakdown is not feasible, aggregates of CEPA classes may be reported under only one of the CEPA classes concerned, following a dominance principle. Such cases should be properly indicated by a footnote.

ADDITIONAL VOLUNTARY CHARACTERISTICS

The questionnaire allows reporting additional characteristics (=variables) on a voluntary basis, as follows:

- In Table 1 (general government and NPISH units) the following variables: Intermediate consumption (P2.1), intermediate consumption of EP services (P2_EPS.1), intermediate consumption except EP services (P2_NEPS.1), compensation of employees (D1.1), ancillary EP output (simplified valuation legally acceptable) (P1_ANC.1) other taxes less subsidies on production (D29.D39.1), consumption of fixed capital (P51C.1), net operating

surplus (B2N.1), related non-EP outputs (RNO.1), employment (EMP.1), intermediate consumption of EP services (for production of EP services and for other production) (P2_EPS_EXT.1)

- In Table 2 (corporations as producers of market EP services - specialist producers and secondary producers), the following variables: Gross fixed capital formation and acquisition less disposals of non-financial non-produced assets (P51G_NP.2), intermediate consumption (P2.2), intermediate consumption of EP services (P2_EPS.2), intermediate consumption except EP services (P2_NEPS.2), compensation of employees (D1.2), ancillary EP output (simplified valuation legally acceptable) (P1_ANC.2), other taxes less subsidies on production (D29.D39.2), consumption of fixed capital (P51C.2), net operating surplus (B2N.2), EP market output (P11.2), EP market output from main activities (P11_MA.2), EP market output from secondary activities (P11_SA.2), related non-EP output (RNO.2), employment (EMP.2), intermediate consumption of EP services (for production of EP services and for other production) (P2_EPS_EXT.2)
- In Table 3 (corporations as ancillary producers and users of EP services) and sub-tables 3a to 3e and 3b_Add, the following variables: Gross fixed capital formation and acquisition less disposals of non-financial non-produced assets (P51G_NP.3), gross fixed capital formation on specific EP fixed assets (formerly called end-of-pipe technologies) (INV_EOP.3), gross fixed capital formation on cleaner EP fixed assets (formerly called integrated technologies) (INV_IT.3), intermediate consumption (P2.3), intermediate consumption of EP services (P2_EPS.3), intermediate consumption except EP services (P2_NEPS.3), compensation of employees (D1.3), ancillary EP output (simplified valuation legally acceptable) (P1_ANC.3), other taxes less subsidies on production (D29.D39.3), consumption of fixed capital (P51C.3), ancillary EP output (ESA-compatible output) (P1_ANC_ESA.3), related non-EP output (RNO.3), employment (EMP.3), intermediate consumption of EP services (for production of EP services and for other production) (P2_EPS_EXT.3)
- In Table 4 (total supply), the only voluntary variable is the EP supply at purchaser's prices available for national uses (SUP_NU.4), which is derived automatically from mandatory variables
- In Table 5 (households), the final consumption of specific EP goods and cleaner EP goods (formerly called connected and adapted goods) (P3_ACP.5)
- In Table 6 (transfers), the following variables: Current transfers received by general government from the rest of the world (D3_D7_REC_GG.6), investment grants and other capital transfers received by general government from the rest of the world (D92_D99_REC_GG.6), current transfers received by corporations (D3_D7_REC_CORP.6), capital transfers received by corporations (D92_D99_REC_CORP.6), earmarked taxes paid by corporations (TAX_EM_PAY_CORP.6), earmarked taxes paid by households (TAX_EM_PAY_HH.6), current transfers received by the rest of the world from general government (D3_D7_REC_RW.6), investments grants and other capital transfers received by the rest of the world from general government (D92_D99_REC_RW.6), Negative net operating surplus of market producers in general government sector (non-consolidated) (NEGB2N_GG.6).

Figure 7 summarizes the structure of the tables for the voluntary reporting: characteristics to be reported by institutional sector. Mandatory characteristics presented above are indicated in bold.

Figure 7: Tables for voluntary reporting

Sheet / Table	1	2	3	4	5	6
Sector	General government and NPISH	Corporations: EPS market producers	Corporations: other (also covering producers of ancillary EPS)	Total supply	Households	(transfers)
(P51G_NP) Gross fixed capital formation *	X	X	X			
(INV_EOP) GFCF specific EP fixed assets			x			
(INV_IT) GFCF cleaner EP fixed assets			x			
(P2) Intermediate consumption	x	x	x			
(P2_EPS) Intermediate consumption of EP services	x	x	x			
(P2_EPS_SP) Intermediate consumption of EP services by specialist producers		X				
(P2_NEPS) Intermediate consumption (excluding EP services)	x	x	x			
(D1) Compensation of employees	x	x	x			
(P1_ANC) ancillary EP output, legally acceptable valuation			X			
(P1_ANC_ESA) ancillary EP output, ESA valuation			x			
(P1_ANC) ancillary EP output, legally acceptable valuation	x	x				
(D29-D39) Other taxes less subsidies on production	x	x	x			
(P51C) Consumption of fixed capital	x	x	x			
(B2N) Net operating surplus ((P1)+ (RBP) - (P2) - (D1) - (P51C) - (D29-D39))	x	x				
(P1) EP output	X					
(P11) EP market output	X	X				
(P11_MA) EP market output		x				
(P11_SA) EP market output		x				
(P13) EP non-market output	X					
(P7) Imports of EP services				X		
(P6) Exports of EP services				X		
(D21-D31) VAT and other taxes less subsidies on EP services				X		
(SUP_NU) EP supply at purchaser's prices available for national uses						
(RNO) Related non-EP output	x	x	x			
(EMP) Employment	x	x	x			
(P3_EPS) Final consumption of EP services	X					
(P3_ACP) Final consumption of specific EP goods and cleaner EP goods					X	
(P2_EXT_EPS) Total intermediate consumption of EP services	x	x	x			
(D3_D7_D92_D99_PAY_GG) General government: total transfers paid						X
(D3_D7_D92_D99_REC_GG) General government: transfers received from RW **)						X
(D3_D7_REC_GG) GG: current transfers received from RW **)						x
(D92_D99_REC_GG) GG: capital transfers received from RW **)						x
(D3_D7_D92_D99_REC_CORP) Corporations: transfers received from GG and RW **)						X
(D3_D7_REC_CORP) Corporations: current transfers received from the GG and RW **)						x
(D92_D99_REC_CORP) Corporations: capital transfers received from GG and RW **)						x
(TAX_EM_PAY_CORP) Corporations: earmarked taxes paid						x
(D3_D7_D92_D99_REC_HH) Households: transfers received from GG and RW **)						X
(TAX_EM_PAY_HH) Households: earmarked taxes paid						x
(D3_D7_D92_D99_PAY_RW) Rest of the world: total transfers paid						X
(D3_D7_D92_D99_REC_RW) Rest of the world: transfers received from GG **)						X
(D3_D7_REC_RW) RW: current transfers received from GG **)						x
(D92_D99_REC_RW) RW: capital transfers received from GG **)						x
(NEGB2N_GG) Negative NOS of market producers in GG sector (non-consolidated) **)						x

x

To be filled in (voluntary)

X

Already filled in (mandatory)

Not applicable

Automatically calculated

*) and acquisitions less disposals of non-produced non-financial assets

**) GG: general government; RW: rest of the world

3.4. Calculation of national expenditure

SEEA-CF proposes the calculation of "total national expenditure on environmental protection". Regulation (EU) No 691/2011 makes some simplifications and defines a measure of "total national expenditure on environmental protection". They are not identical.

This section explains first the calculation of "total national expenditure on environmental protection" according to SEEA-CF and how "national expenditure for environmental protection" as defined by Regulation (EU) No 691/2011 can be calculated using only the items from the mandatory part of the questionnaire. The differences between them are discussed, as well as some limitations due to the use of only the mandatory items. The following sub-sections propose some improvements to the calculation of "national expenditure on environmental protection" using data from the voluntary part of the questionnaire.

Regulation (EU) No 691/2011 does not impose arranging the reporting items in a way that presents the financing of the national expenditure on environmental protection by sector. However, as this is an interesting application of the EPEA data.

TOTAL NATIONAL EXPENDITURE ON ENVIRONMENTAL PROTECTION IN THE SEEA-CF

SEEA-CF (§ 4.85) defines total national expenditure on environmental protection as:

- Final consumption, intermediate consumption, and gross fixed capital formation on all environmental protection goods and services (specific services, connected products⁽⁴¹⁾ and adapted goods⁽⁴²⁾), except intermediate consumption and gross fixed capital formation for characteristic activities;
- *Plus* gross fixed capital formation (and acquisition less disposal of non-produced non-financial assets) for environmental protection characteristic activities;
- *Plus* environmental protection transfers by resident units not captured in the items above;
- *Plus* environmental protection transfers paid to the rest of the world;
- *Less* environmental protection transfers received from the rest of the world.

This definition covers the uses of all EP products (not only EP services), except the use as intermediate consumption and gross fixed capital formation for characteristic EP activities (i.e., for the production of EP specific services). In addition, also the gross fixed capital formation and net acquisition of non-produced non-financial assets are included if they are for characteristic EP activities.

To avoid double counting, EP transfers paid by resident units are only included if they are not yet captured in final consumption, intermediate consumption, gross fixed capital formation or net acquisition of non-produced non-financial assets.⁽⁴³⁾ Resident units may also pay EP transfers to the rest of the world. Those must be included in total national expenditure on environmental protection. Expenditure financed with transfers received from the rest of the world must be excluded from the national expenditure on environmental protection. Examples of such transfers are e.g. in European countries various programs of EU institutions provide financing for environmental protection activities, through the financing of investments or by supporting e.g. environmentally friendly agricultural production.

NATIONAL EXPENDITURE FOR ENVIRONMENTAL PROTECTION IN REGULATION (EU) NO 691/2011

Regulation (EU) No 691/2011 defines “national expenditure for environmental protection” as:

- The sum of uses of EP services by resident units;
- *Plus* gross fixed capital formation (GFCF) for environmental protection activities;
- *Plus* transfers for environmental protection which are not a counterpart of previous items;
- *Less* financing by the rest of the world.

This definition is similar to the SEEA-CF “total national expenditure on environmental protection” but not identical:

- The most obvious difference is that it does not include the uses of EP other than EP services i.e. specific EP goods (=connected goods) and cleaner EP goods (=adapted goods). This is because the Regulation only covers EP services;

⁽⁴¹⁾ Called 'specific EP goods' in this handbook

⁽⁴²⁾ Called 'cleaner EP goods' in this handbook

⁽⁴³⁾ Some EP transfers are already captured in the uses of EP services or GFCF (and acquisition less disposals of non-produced non-financial assets) of the units that receive them; e.g. investments grants are captured in the corresponding GFCF and these transfers should not be added a second time. Only EP transfers that are not captured in the uses of EP services and in the GFCF (and acquisition less disposals of non-produced non-financial assets) should be added. They mainly correspond to subsidies on EP services and other subsidies on the production of EP services

- The definition also does not include net acquisition of non-produced non-financial assets for environmental protection activities.

The definition in Regulation (EU) No 691/2011 does not explicitly exclude from the sum of uses the intermediate consumption of EP services used for the production of EP services. However, intermediate consumption of EP services by specialist producers is one of the characteristics mandatory under Regulation (EU) No 691/2011. It is therefore possible to deduct this item from the sum of uses in order to avoid double-counting.

Based on the mandatory characteristics it is however not possible to deduct from the sum of uses the GFCF in EP services used for the production of EP services. It may cause some double counting with gross fixed capital formation for environmental protection activities.

The definition in Regulation (EU) No 691/2011 does not explicitly include net acquisitions of non-produced non-financial assets for the production of EP services. The reporting requirements according to Regulation (EU) No 691/2011 cover GFCF and acquisitions less disposals of non-produced non-financial assets for the production of EP services. Non-produced non-financial assets are therefore to be included in national expenditure on environmental protection.

In practice some further differences to the SEEA-CF definition of “total national expenditure on environmental protection” must be acknowledged if the calculation of NEEP is to be entirely based only on those characteristics and breakdowns to be reported for Regulation (EU) No 691/2011:

- The Regulation includes “environmental protection transfers (received/paid)” as one of the characteristics to be reported. However, it does not require disclosing those transfers already captured in the uses of EP services or GFCF for environmental protection activities;
- The Regulation does not require reporting all expenditure (or output) in all CEPA classes. For example, it only requires EP services output in CEPA 2, 3 and 4 for corporations as secondary and specialist producers and only EP services consumption in CEPA 2 and 3 for households.

It is clear from the above considerations that it is only possible to calculate a proxy for NEEP based on the items to be reported according to Regulation (EU) No 691/2011 Annex IV. In agreement with the WG environmental expenditure statistics (meeting April 2016), this handbook proposes to calculate the proxy of national expenditure on environmental protection based on the mandatory part of the EPEA questionnaire as follows:

Table 8: Proxy of national expenditure on environmental protection

Proxy of national expenditure on environmental protection =		
Sum of uses of EP services by residents (at purchasers' prices)	+	P13.1 Non-market output of EP services by the general government and NPISHs
	+	P11.1+ P11.2 Market output of EP services by government and NPISH and by corporations as specialist and secondary producers of market EP services
	+	P1 Anc.3 Ancillary output of EP services (legally acceptable valuation) by other corporations
	+	D21-D31.4 VAT and other taxes less subsidies on products
	-	P2_EPS_SP.4 Intermediate consumption of EP services by specialist producers (corporations specialist producers and general government producers of EP services)
	+	(P7.4-P6.4) Imports less exports of EP services
Gross fixed capital formation (GFCF) for environmental protection activities	+	P51G_NP.1 Gross fixed capital formation (GFCF) and acquisitions less disposals of non-produced non-financial assets for the production of EP services by the general government and NPISHs
	+	P51G_NP.2 Gross fixed capital formation (GFCF) and acquisitions less disposals of non-produced non-financial assets for the production of EP services by corporations as specialist and secondary producers of market EP services
	+	P51G_NP.3 Gross fixed capital formation (GFCF) and acquisitions less disposals of non-produced non-financial assets for the production of EP services by other corporations.
Transfers for environmental protection which are not a counterpart of use and GFCF	+	TR_REC_RW Rest of the world: current and capital transfers received from the general government (D3_D7_D92_D99_REC_RW.6)
Financing by the rest of the world	-	TR_PAY_RW Rest of the world: current and capital transfers paid to the general government, corporations and households (D3_D7_D92_D99_PAY_RW.6)

Sum of uses of environmental protection services by resident units

In principle, the uses of EP services are calculated by adding single use components: final consumption expenditure, intermediate consumption and gross fixed capital formation. However, intermediate consumption of EP services is only mandatory for specialist producers of the corporation sector.

The uses of EP services by residents can be calculated with a balancing equation which adds non-market, market and ancillary output of EP services and imports less exports of EP services. To adjust from valuation at basic price to valuation at purchaser's price the VAT and other taxes less subsidies on products need to be added. Intermediate consumption of EP services by specialist producers is subtracted to avoid double counting of expenditure on EP services that is used to produce EP services. This is so because the intermediate consumption of EP services by specialist producers is already included in the expenditure of other units purchasing EP services from specialist producers.

The balancing item covers final and intermediate consumption of EP services (except by specialist producers), gross fixed capital formation in EP services (e.g. environmental R&D and other capitalised EP services) and the use of ancillary EP services (simplified valuation legally acceptable).

GFCF and net acquisitions of non-produced non-financial assets

Among the means that resident units devote to environmental protection are those for the acquisitions less disposals of assets used in the production of EP services. These consist in gross fixed capital formation (GFCF) and net acquisition of non-produced non-financial assets. Non-produced assets consists mainly of land and some water bodies.

Current and capital transfers for environmental protection which are not counterpart of the previous items

Environmentally motivated production subsidies may be covered in the mandatory item on corporation's current and capital transfers received from the general government and the rest of the world (characteristic D3_D7_D92_D99_REC_CORP). However, this item will in general mostly include capital transfers already captured in GFCF. Therefore this handbook recommends not including these transfers in the national expenditure except if there is evidence that they mostly consist of environmentally motivated subsidies on EP services or other subsidies on the production of EP services.

There is nevertheless a category of transfers that is clearly not captured in the two first components of NEEP: environmental transfers paid to the rest of the world. These transfers should be added for calculating the NEEP.

Financing by the rest of the world

Finally, current and capital transfers paid by the rest of the world to the general government, corporations and households need to be subtracted to arrive at NEEP.

Limitations of the NEEP calculation

From the above it is clear that the measure proposed for NEEP based on the mandatory items of the EPEA questionnaire is not perfect: not all CEPA classes are completely covered, there can be double counting of some uses of EP services as GFCF, some non-counterpart environmental transfers may not be included or some counterpart environmental transfers may be double counted, depending on the decision taken to include or not in NEEP the transfers received by corporations.

The next section explores how to improve the proxy making use of the items of the voluntary parts of the EPEA questionnaire.

IMPROVING THE ESTIMATION OF NEEP USING THE VOLUNTARY EPEA DATA COLLECTION

The estimation of NEEP can be improved whenever data are available from the voluntary parts of the EPEA questionnaire. Countries with enough capacity and data sources may consider the following refinements.

NEEP can then include expenditure on services produced by corporations as secondary and specialist producers in all CEPA classes (whereas in the mandatory reporting only the production of CEPA 2, 3 and 4 of this producer category is covered).

The ancillary output with simplified valuation legally acceptable (P1_ANC.3) can be improved with the ESA compatible valuation (P1_ANC_ESA.3). This increases the NEEP by the consumption of fixed capital resulting from ancillary production of EP services (P51C.3) and adds other taxes on ancillary production less other subsidies on ancillary production (D29-D39.3).

P2_EPS_SP.4 can be replaced by the sum of P2_EPS.1 plus P2_EPS.2: this would allow deducting not only intermediate consumption of EP services for the production of EP services by specialist producers but also the intermediate consumption of EP services by secondary producers of the

corporation sector (see SEEA-CF § 4.83).

The voluntary part includes D3_D7_REC_CORP.6 (Corporations: current transfers received from the GG and rest of the world), which may be a valid estimate of the EP transfers not captured in the uses of EP services. This item is recorded as expenditure of general government under the assumption that the rest of the world does not directly subsidize the production of EP services.

CONTRIBUTIONS TO NEEP BY INSTITUTIONAL SECTORS

It is possible to calculate the contributions to NEEP by institutional sectors: general government and NPISH, corporations and households.⁽⁴⁴⁾

Table 9: Contributions to national expenditure on environmental protection by institutional sector

General government and NPISH: expenditure on environmental protection =		
Uses of EP services	+ P3_EPS.1	Final consumption expenditure of EP services
	+ (P2_EPS_EXT.1) - (P2_EPS.1)	Intermediate consumption of EP services for production of EP services and for other production by government and NPISH less intermediate consumption of EP services for production of EP services by government and NPISH ^{*)}
GFCF for EP activities	+ P51G_NP.1	Gross fixed capital formation (GFCF) and acquisitions less disposals of non-produced non-financial assets for the production of EP services
Transfers for EP which are not a counterpart of use and GFCF	+ D3_D7_REC_CORP.6	Corporations: current transfers received from the general government and the rest of the world
	+ D3_D7_D92_D99_REC_RW.6	Rest of the world: current and capital transfers received from the general government
Financing by the rest of the world	- D3_D7_D92_D99_REC_GG.6	General Government: current and capital transfers received from the rest of the world

*) Alternatively, if the data to calculate $(P2_EPS_EXT.1 - P2_EPS.1)$ are not available, it may be approximated by balancing supply, final consumption and external trade in EP services and applying a ratio representing the share of the government and NPISH in this balancing item.

⁽⁴⁴⁾ Note that households in EPEA are considered only as consumers and do not include unincorporated enterprises (which are for recording production activities). Whenever data are available unincorporated enterprises should be recorded in EPEA under corporations as specialist, secondary producers or ancillary producers under the corporation sector

Corporations: expenditure on environmental protection =		
Uses of EP services	+ (P2_EPS_EXT.2) - (P2_EPS.2)	Intermediate consumption of EP services for production of EP services and for other production by corporations as specialist and secondary producers of market EP services less intermediate consumption of EP services by corporations as specialist producers ^{*)}
	+ P2_EPS_EXT.3	Intermediate consumption of EP services for production of EP services and for other production by other corporations ^{**)}
	+ P1_ANC_ESA.3	Ancillary output of EP services (ESA compatible) ^{***)}
GFCF for EP activities	+ (P51G_NP.2) + (P51G_NP.3)	Gross fixed capital formation (GFCF) and acquisitions less disposals of non-financial non-produced assets for the production of EP services by corporations as specialist and secondary producers of market EP services and by other corporations
Financing by the rest of the world	+ (D3_D7_D92_D99_PAY_RW.6) - (D3_D7_D92_D99_REC_GG.6)	Current and capital transfers paid by the rest of the world less current and capital transfers received by the general government from the rest of the world ^{****)}

*) Alternatively, if the data to calculate (P2_EPS_EXT.2 - P2_EPS.2) are not available, it may be approximated by balancing supply, final consumption and external trade in EP services and applying a ratio representing the share of the specialist and secondary producers in this balancing item.

**) It is not necessary to deduct the intermediate consumption of EP services for the production of EP services by other corporations (i.e., P2_EPS.3) because ancillary output - estimated as sum of costs already excludes the intermediate consumption of EP services. Note P1_ANC is defined as P2_NEPS + D1.

***) If this item is not available, the legally accepted valuation of ancillary EP output (P1_ANC) may be used instead.

****) This item corresponds to the current and capital transfers received by corporations from the rest of the world under the assumption that direct current and capital transfers of the rest of the world to households are negligible.

Households: expenditure on environmental protection =		
Uses of EP services	+ P3_EPS.5	Final consumption of EP services

Adding up the environmental protection expenditure by sectors using also variables from the voluntary part of the EPEA questionnaire may therefore not only provide a wider coverage of EP expenditure but also exclude some (limited) double counting in the NEEP aggregate as calculated from the mandatory variables.

An interesting further improvement is to break down D3_D7_REC_CORP.6 (Corporations: current transfers received from the general government and the rest of the world) by sectors according to their share of uses of EP services. This allocates the subsidies not already captured in the uses to the uses by institutional sector.

Finally it needs to be mentioned that a breakdown of NEEP by sectors is also possible even if the voluntary variables are not available:

Items (P2_EPS_EXT.1 - P2_EPS.1), (P2_EPS_EXT.2 - P2_EPS.2) and P2_EPS_EXT.3 can be replaced by the balancing item: (P13.1 + P11.1 + P11.2 + D21-D31.4 + (P7.4-P6.4) - P2_EPS_SP.4 - P3_EPS.1 - P3_EPS.5) supplemented with assumptions to allocate it by sector. In the simplest case it may be assumed that 100% of the balancing item is allocated to corporations. If the balancing item is used it includes uses of EP services as GFCF and therefore generates some double counting as does the proxy of NEEP based on mandatory variables.

PRESENTING THE FINANCING OF NEEP BY SECTOR

It is possible to provide a picture of the financing of EP based on the mandatory variables. This is presented in the following table. The sum of the three columns (general government and NPISH, corporations, households) provides the proxy for the various components of NEEP and the last row the financing by sector.

Table 10: Financing of national expenditure on environmental protection

	General government and NPISH	Corporations	Households
	+ P3_EPS.1		+ P3_EPS.5
Uses of EP services		+ P2*	
		+ P1_ANC.3	-
GFCF for EP activities	+ P51G_NP.1	+ P51G_NP.2 + P51G_NP.3	
Transfers for environmental protection which are not a counterpart of uses and GFCF	+ TR_REC_RW		
Other transfers	+ (TR_PAY_GG – TR_REC_RW) - TR_REC_GG	- TR_REC_CORP	- TR_REC_HH
Total = Financing of NEEP	Σ GG	Σ CORP	Σ HH

with $P2^* = P13.1 + P11.1 + P11.2 + D21-D31.4 + (P7.4-P6.4) - P2_EPS_SP.4 - P3_EPS.1 - P3_EPS.5$

In the above presentation it is assumed that 100% of the balancing item $P2^*$ is allocated to corporations. This proxy estimate can be replaced by more detailed information on the intermediate consumption from the voluntary part. Furthermore $P2^*$ includes uses of EP services as GFCF which may cause some double counting.

The presentation of financing can also be improved using data from the voluntary part: the previous section explained how the measurement and allocation of the uses by sectors can be improved with an improved valuation for ancillary output and detailed information on the intermediate consumption of EP services. The measurement of the transfers not captured in the uses can also be improved with data on current transfers.

The presentation of financing can be further extended by accounting for implicit subsidies and earmarked taxes. This is shown in Table 11 below:

- If a market producer of EP services in the general government has a negative net operating, it may be regarded as an implicit subsidy paid by the general government to produce EP services, which can be added to the financing by the general government;
- Earmarked taxes are financed by corporations and households and can be regarded as reducing the net financing of government on environmental protection.

Table 11: Accounting for implicit transfers and earmarked taxes

	General government and NPISH	Corporations	Households
Negative net operating surplus of market producers in general government sector (non-consolidated)	+ NEGB2N_GG	-	-
Earmarked taxes	- TAX_EM_PAY_CORP - TAX_EM_PAY_HH	+ TAX_EM_PAY_CORP	+ TAX_EM_PAY_HH

Note that the inclusion of negative net operating surplus of market producers in general government sector increases the NEEP, whereas taking into account earmarked taxes does not change the NEEP but only its financing.

4

Data sources

This chapter presents the main data sources to compile EPEA. Figure 8 provides an overview of the main data sources and the EPEA characteristics.

Figure 8: Main data sources



Regulation (EU) No 691/2011 states that “the environmental protection expenditure accounts should make use of the already existing information from the national accounts (production and generation of income accounts; GFCF by NACE, supply and use tables; data based on the classification of functions of government), structural business statistics, business register and other sources.” However those data sources rarely may be used straight in EPEA, instead they may require adjustments for scope, valuation, additional breakdowns, etc. The processing of the sources is presented in Chapter 5 'Filling-in the tables'.

4.1. National accounts

National accounts data are presented here with the breakdowns required in the ESA 2010 transmission programme (ESA 2010 TP)⁽⁴⁵⁾, which requires data by industry to be reported at A*21 or A*64 NACE breakdown level. Furthermore some of the ESA 2010 TP data are only available with relatively long time-lags (e.g. supply-use-tables). They should be seen as a minimum dataset available. In many countries more detailed or timelier national accounts data are available, in particular as concerns the breakdowns by industries.

Four types of national accounts ESA 2010 TP data are examined in the next sections: the supply table at basic prices, including transformation into purchaser's prices; the use table at purchaser's prices, including a simplified production and generation of income accounts; industry tables and general government expenditure by function.

4.1.1. Supply and use tables

Supply and use tables (SUT) are one of the most important presentation of national accounts about the supply and use of products linked with data on industries, according to CPA and NACE classifications.

The supply table shows the supply of goods and services by product and by producing industry, distinguishing domestic supply and imports. Those are valued at basic prices. The supply table can be extended with additional columns reporting the items to value supply of products at purchaser's prices. The published supply table normally does not distinguish output into market output, output for own final use and non- market output; however this information may be available from national accounts or may be further elaborated by disaggregating the output by industry also in market output, output for own final use and non- market output.

The use table shows the use of goods and services categorised by product and by category of use, as follows:

- (a) intermediate consumption by industry;
- (b) final consumption expenditure: households, general government and NPISH;
- (c) gross capital formation;
- (d) exports

In the columns under the intermediate consumption by industry, the use table shows the components of gross value-added, as follows:

- (a) compensation of employees;
- (b) other taxes less subsidies on production;
- (c) net mixed income, net operating surplus and consumption of fixed capital.

The use table sometimes also discloses GFCF (which is a component of gross capital formation) and shows labour inputs by industries as supplementary item.

Supply and use tables may be used for all market and non-market EP services, once the corresponding CPA products have been identified. The examples below focus on CPA 37-39 products.

Supply and use tables have good product and industry detail but they normally become available very late. This is one of their main limitations.

⁽⁴⁵⁾ See <http://ec.europa.eu/eurostat/web/products-manuals-and-guidelines/-/KS-01-13-429-3A-C>

Table 12: Supply table at basic prices incl. transformation into purchaser's prices (Netherlands year 2012; million EUR - extract)

PROD_NA/INDUSE	NACE 01 - 36	NACE 37-39	NACE O	other NACE	TOTAL - Total output	Imports	Taxes less subsidies on products	Trade and transport margins	Supply at purchasers' prices
CPA A - E36	345.2	1.7	0.1	9.6	356.6	368.8	38.1	126.3	889.8
CPA E37 - E39 products	0.5	5.6	5	2.6	13.7	3.8	0.4	0.1	18
CPA F - U and adjustments	28.5	0.2	70.1	786.7	885.5	94.1	22.8	-126.4	876.1
TOTAL	374.2	7.6	75.2	798.9	1 255.80	466.7	61.3	0	1 783.80
P11 - Market output	367.5	7.5	10.5	713.8	1 099.30	:	:	:	:
P12 - Output for own-final use	4	0	1.9	43.2	49.2	:	:	:	:
P13 - Other non-market output	2.6	0.1	62.7	41.9	107.3	:	:	:	:

Source: Eurostat (online data code naio_10_cp15); last update: 06.06.16; extracted: 12.06.16

Table 13: Use table at purchaser's prices (Netherlands, 2010, million EUR - extract)

PROD_NA/INDUSE	Intermediate consumption					Final consumption expenditure						
	NACE A E36	NACE E37-E39	NACE O	other NACE	Total	Households	NPISH	Government	Gross Capital formation	Exports O	Total final use	Total use
CPA A-E36	210.7	1.1	4.4	81	297.2	127	0	5.9	33.8	425.8	592.6	889.8
CPA E37-E39	1.9	2.4	2	1.4	7.7	1.6	0	2.6	0	6	10.3	18
CPA F-U	52.4	1.4	24.6	288.6	367	155.7	5.5	161.3	89.8	96.8	509	876.1
Total intermediate consumption	265.1	5	370.9	31	672	284.3	5.5	169.9	123.6	528.6	1 111.80	1 783.80
Compensation of employees	44	1.4	247	30.3	322.8	:	:	:	:	:	:	:
D 29-39	-0.5	0	-0.5	0.2	-0.7	:	:	:	:	:	:	:
Consumption of fixed capital	21.7	0.7	71.9	13.6	107.9	:	:	:	:	:	:	:
NOS and mixed income	43.8	0.5	109.6	0	153.8	:	:	:	:	:	:	:
Gross value added	109.1	2.6	428	44.2	583.8	:	:	:	:	:	:	:
Output	374.2	7.6	798.9	75.2	1 255.80	:	:	:	:	:	:	:
Gross fixed capital formation	:	:	:	:	:	:	:	:	:	:	:	:
Labour inputs	:	:	:	:	:	:	:	:	:	:	:	:

Source: Eurostat (online data code naio_10_cp16); last update 06.06.16; extracted: 12.06.16

Data from the ESA 2010 transmission program

The examples above are data transmitted under the ESA 2010 TP. Under this programme all EU countries shall produce and transmit to Eurostat supply and use tables at A*64 level (Table 15: Supply table at basic prices, including transformation into purchaser's prices, and Table 16: Use table at purchaser's prices). Those tables are transmitted 36 months after the end of the reference year. Some countries may have those tables available earlier, e.g. after 24 months, or may have a provisional, early estimate for those tables.

The following tables present some data extracted from Eurostat' online databases (naio_10 cp15 and naio_10cp16):

- Output of CPA 37-39 products by industries;
- Output of NACE 37-39 by type of output;
- Final consumption of CPA 37-39 products;
- Intermediate consumption of CPA 37-39 by industries (including by NACE 37-39);
- Structure of the costs of production of NACE 37-39.

a) Output of CPA 37-39 products by industries

In general, CPA 37-39 products are almost exclusively the output of producers classified in NACE 37-39, although producers classified in NACE E36 (Water collection, treatment and supply) may have a significant secondary output of products CPA 37-39. In at least two countries (France and Netherlands), CPA 37-39 products are also the secondary output of units classified in NACE O.

Table 14: Output of CPA 37 39 products by NACE, 2010
(million EUR)

	C16	C24	D	E36	E37-E39	G46	O	other NACE	TOTAL
Belgium	13	230	17	262	6 456	79	553	362	7 971
Czech Republic	55	104	40	487	2 574	11	314	187	3 773
Denmark	9	23	0	0	3 534	0	0	66	3 631
Germany	0	0	1 208	1 852	38 543	0	0	0	41 603
France	0	0	0	0	26 412	0	8 796	445	35 653
Italy	73	2 856	5	2 028	27 623	168	0	1 350	34 103
Hungary	2	2	8	248	1 067	50	0	43	1 421
Netherlands	8	75	0	50	5 570	2 190	4 750	555	13 198
Austria^{*)}	295	84	68	29	5 578	17	8	143	6 222
Poland	3	2	56	531	4 764	167	0	155	5 677
Portugal	57	8	0	251	2 434	8	15	34	2 808
Slovenia	0	2	3	75	440	4	0	44	568
Slovakia	0	7	5	172	447	31	7	59	729
Sweden	22	320	156	58	3 536	0	:	:	4 427
United Kingdom	0	0	0	0	29 010	0	0	34	29 044
Norway	0	0	0	0	3 847	0	0	0	3 847

^{*)} year 2011

Source: Eurostat (online data code naio_10_cp15); last update: 17.08.15, extracted: 28.08.15

b) Output of NACE 37- 39 by type of output

Output of producers in NACE 37-39 is almost exclusively market output; United Kingdom is an exception with a significant share of non-market output. In general producers classified in the NACE 37-39 have secondary output in other products (up to 20% of total output for five countries).

Table 15: Output of NACE 37-39 by products and category of output, 2010 (million EUR)

	NACE 37-39 output			of which		
	37-39 products	other products	TOTAL	P11	P12	P13
Belgium	6 456	279	6 734	6 728	7	0
Czech Republic	2 574	417	2 992	2 882	5	104
Denmark	3 534	348	3 882	:	:	:
Germany	38 543	2 926	41 469	41 215	254	0
France	26 412	0	26 412	26 412	0	0
Italy	27 623	5 932	33 555	:	:	:
Hungary	1 067	227	1 294	1 163	6	126
Netherlands	5 570	1 547	7 117	7 012	27	78
Austria*	5 578	330	5 908	5 896	13	0
Poland	4 764	1 250	6 013	5 613	28	372
Portugal	2 434	268	2 702	2 433	77	192
Slovenia	2 474	354	2 829	2 586	26	217
Slovakia	447	114	560	527	6	27
Sweden	3 536	311	3 846	3 843	4	0
United Kingdom	29 010	2 012	31 022	23 612	166	7 245
Norway	3 847	81	3 927	3 927	0	0

*) year 2011

Source: Eurostat (online data code naio_10_cp15); last update: 17.08.15, extracted: 28.08.15

c) Final consumption of CPA 37-39 products

Final consumption of CPA 37-39 products is generally households' final consumption; however in five countries general government represents more than 25% of final consumption of CPA 37-39 products.

Table 16: Final consumption of CPA 37-39 products, 2010 (million EUR)

	Final consumption expenditure			Total
	Households	NPISH	General Government	
Belgium	801	0	328	1 129
Czech Republic	637	1	89	726
Denmark	2 027	0	0	2 027
Germany	12 815	0	539	13 354
France	7 971	0	0	7 971
Italy	7 903	0	15	7 918
Hungary	594	0	106	700
Netherlands	1 572	0	2 452	4 024
Poland	1 024	0	364	1 389
Portugal	404	0	192	596
Slovenia	153	0	0	153
Slovakia	398	0	27	426
United Kingdom	5 259	0	7 245	12 504
Norway	812	0	-26	786

Source: Eurostat (online data code naio_10_cp16); last update: 17.08.15, extracted: 28.08.15

d) Intermediate consumption of CPA 37-39 products by NACE 37-39 industries

The use table shows that specialist producers in NACE 37-39 often have very important intermediate consumption of CPA 37-39 products; this intermediate consumption may represent more than one third of the output of NACE 37-39.

Table 17: Intermediate consumption of CPA 37 39 products by NACE 37-39 producers, 2010 (million EUR)

	Intermediate consumption of 37- 39 products by NACE 37-39 producers	Output of NACE 37-39	ratio
	(1)	(2)	(1) / (2)
Belgium	3 320	6 734	49%
Czech Republic	741	2 992	25%
Denmark	587	3 882	15%
Germany	7 060	41 469	17%
France	6 570	26 412	25%
Italy	11 402	33 555	34%
Hungary	166	1 294	13%
Netherlands	2 386	7 117	34%
Austria*	2 265	5 908	38%
Poland	591	6 013	10%
Portugal	957	2 702	35%
Slovenia	231	617	37%
Slovakia	28	560	5%
Sweden	556	3 846	14%
United Kingdom	6 669	31 022	21%
Norway	668	3 927	17%

*) year 2011

Source: Eurostat (online data code naio_10_cp16); last update: 17.08 15, extracted: 28.08.15

e) Structure of production costs

The use table offers a summary of the production and generation of income accounts, i.e. the decomposition of the production costs. The results show that this structure is very different across countries, e.g. the compensation of employees varies from 37% of gross value added in some countries to more than 70% in others.

Table 18: Structure of the production costs of the NACE 37-39, 2010 (%)

	Shares of gross value added (%)				
	Gross value added as % of output	Compensation of employees	Other taxes less other subsidies on production	Consumption of fixed capital	Operating surplus and mixed income, net
Belgium	28.1	48	-8	42	18
Czech Rep.	34	47	1	21	32
Denmark	36.5	37	2	49	11
Germany	45.2	41	-2	54	7
France	39.1	55	2	43	
Italy	28.6	62	5	26	6
Hungary	46.6	52	2	21	25
Netherlands	35.6	55	-1	24	22
Austria*	40.4	37	2	43	19
Poland	48.3	43	6	20	31
Portugal	36.2	51	1	16	33
Slovenia	28.2	71	-7	30	6
Slovakia	59	43	1	14	43
Sweden	30.9	47	10	31	12
United Kingdom	47.9	46	2	52	
Norway	34.6	54	2	34	10

(*) data for year 2011

Source: Eurostat (online data code naio_10_cp16); last update: 17.08.15, extracted: 28.08.15

Whenever available at the level of NACE divisions 37, 38 and 39, supply and use tables would provide the value of market and non-market output as well as the value of some other EPEA characteristics (final consumption, structure of the production costs) for that part of EP services of the CEPA classes 2, 3 and 4 which corresponds to CPA 37-39 products.

However even when data are available at the level of NACE divisions 37, 38 and 39, the supply-use tables would suffer from two limitations:

- It would be necessary to disclose group 38.3 (materials recovery) from groups 38.1 and 38.2, as 38.3 output mainly corresponds to resource management;
- Data by industries should distinguish the institutional sector (general government on the one side and corporations on the other side) in order to be reported respectively in the EPEA Tables 1 and 2.

Need for more detailed industry breakdowns

Supply and use tables are available at a rather aggregated level although in some countries unpublished data on output following national accounts conventions are available at a more disaggregated level. EPEA compilers are invited to contact the national accountants in order to seek access to the supply and use tables at a more detailed level than A*64. Several countries' EPEA pilot studies report that access to SUT data more detailed than NACE 37-39 could be obtained.⁽⁴⁶⁾

⁽⁴⁶⁾ See for example: Statistics Norway (2014): Evaluation of requirements for EPEA and EGSS in the European Statistical System and Federal Statistical Office (2014). Economy-wide environmental protection expenditure accounts for Germany

Sections 4.1.3 and 4.2 examine how COFOG and SBS data can be used to divide some of the transactions between NACE 37, 38 and 39 when detailed NA data are not available.

It is particularly necessary to take aside NACE group 38.3 (materials recovery services; secondary raw materials), which is a resource management activity. As a first step it is generally possible to obtain the output value of the group 38.3 from national accounts. This value can be deducted from the output of division 38 in order to calculate the total value of the output of groups 38.1 and 38.2. In a second step one must estimate the other components of the supply and use tables (intermediate and final consumption, import, export, VAT and other taxes on services), the structure of the costs of production and the gross fixed capital formation in order to build supply- use tables for the groupings of NACE/CPA 38.1 + 38.2.

As will be seen, structural business statistics (SBS), although not identical to national accounts data, may be suitable to estimate the structure of production costs of 38.3 and applying this structure to national accounts' value of output can deliver an estimate of the costs of production of 38.3 products. SBS can also provide data on the gross fixed capital formation of NACE 38.3.

As concerns the other components of the supply - use tables for NACE 38.3, some simplifying assumptions can be made:

- Exports and imports: it can be assumed that all exports and imports of goods in the NACE 37-39 grouping correspond to CPA 38.3. Exports and imports of secondary raw materials are to be calculated through external trade statistics;
- Trade and transport margins: as there are no margins on services, the total margin of the NACE 37-39 grouping may be attributed to 38.3 products;
- VAT and other taxes less subsidies on products: the allocation of this characteristic may only be done after an examination of the national tax and subsidies system. In justified cases it may be sufficient to allocate them according to the output share of 38.3 in the total NACE 37-39 grouping.

Other assumptions (to be checked country by country) are:

- Final consumption: there is no or insignificant final consumption of materials recovery services or secondary raw materials;
- Intermediate consumption: all supply of CPA 38.3 products available for national uses is used as intermediate consumption;
- All producers of 38.3 belong to the corporations sector.

With these data and assumptions it is possible to disaggregate the SUT of CPA 38 products between a simplified SUT for 38.1 + 38.2 products and a SUT for 38.3 products.

Table 19: Disaggregation of the supply and use of CPA 38 products

	38	of which 38.3	38.1 + 38.2 = 38 – 38.3
1 Output	x (NA)	x (NA or SBS)	Output 38 – output 38.3
2 Imports - exports			
of which Goods	x	x (external trade)	0
of which Services	x	0 (?)	x
3 Distribution margins	x	x (total)	0
4 VAT and other taxes less subsidies on products	x	to be distributed	to be distributed
5 Available for national uses (1+2+3+4)	x	(1+2+3+4)	(1+2+3+4)
Final consumption	x	0	x
Intermediate consumption	x	(1+2+3+4)	by difference with final consumption

Breakdown by institutional sector

The EPEA framework distinguishes between general government and corporations as specialist or secondary producers of EP services.

Although transactions of general government units engaged in CEPA 2 and 3 may be estimated from COFOG and public finance statistics data (see section 4.1.3), it is not easy to determine which part of these transactions is included in the data by industries: a producer in the general government institutional sector may be classified in NACE 37-39.

ESA 2010 § 9.08 presents an example of a table linking supply and use tables to sector accounts. However in practice this type of table is rarely produced systematically. It may be useful to draw such a table linking data by industry and by institutional sector for the industries that are most relevant for EPEA compilation. It would help to avoid double counting and to distribute characteristics between the EPEA tables.

EPEA compilers may produce such table from detailed data cross-classified by industry-institutional sectors provided by national accounts at compilation level. If EPEA compilers cannot get access to those sources, some split may be possible using COFOG and SBS to estimate the share of the sectors.

Table 20: Example of a table linking data by industry and by institutional sector

	Industries (NACE)								
	37			38.1 + 38.2			39		
	GG	CORP	Total	GG	CORP	Total	GG	CORP	Total
Intermediate consumption									
Gross value added									
Compensation of employees									
Other taxes less subsidies on production									
Consumption of fixed capital									
Net operating surplus/mixed income									
Output									
market									
non-market									
Gross fixed capital formation									
Stock of fixed assets									
Employment									

4.1.2. ESA 2010 TP Table 3 (data by industry)

Tables by industry are part of the ESA 2010 TP (Table 3). Those data can also be used for EPEA. The variables of interest for EPEA are shown in Table 21.

Table 21: Example of an industry table

Code	Variable
P1	Output at basic prices
P2	Intermediate consumption
D1	Compensation of employees
D29-D39	Other taxes on production less other subsidies on production
P51C	Consumption of fixed capital
B2n + B3n	Net operating surplus and net mixed income
P51g	Gross fixed capital formation
EMP	Employment

Because those variables have the same level of aggregation as the SUT, their main interest for EPEA is that they are available with better timeliness than supply use tables. Data must be delivered annually after 9 months for the A*21 NACE breakdown and after 21 months for the A*64 breakdown. Data from ESA 2010 TP Table 3 are conceptually consistent with the SUT but differences may exist due to revisions and data vintages.

Data by industry are published in three Eurostat data sets:

- National accounts aggregates by industry (up to NACE A*64) (nama_10_a64)
- Gross capital formation by industry (up to NACE A*64) (nama_10_a64_p5)
- National accounts employment data by industry (up to NACE A*64) (nama_10_a64_e)

In many countries data are available at a more disaggregated level than A*64 and may provide the total of EPEA characteristics P1, P2, D1, D29_D39, P51C, B2N and EMP over the two first tables of the EPEA questionnaire for CEPA 2 (NACE 37), CEPA3 (NACE 38.1+38.2) and CEPA 4 (NACE 39), as well as for other NACE classes. EPEA compilers may start from those data for distributing the characteristics between Table 1 (general government) and Table 2 (corporations as market

producers).

4.1.3. COFOG data

General presentation of COFOG data

The ESA 2010 TP requests Member States to deliver data on general government expenditure by function in Table 11. These data are broken down by function according to the Classification of the Functions of Government (COFOG)⁽⁴⁷⁾ and by economic nature. COFOG data cover all institutional units of the ESA 2010 general government institutional sector; therefore they also include data for the local KAUs of the government sector that are market producers. COFOG data are to be provided to Eurostat after 12 months.

COFOG data are a basic source for the compilation of the Table 1 (general government) of the EPEA questionnaire. They must however be completed by other data from public finance statistics or budget analysis.

Environmental protection function

One of the functions of the COFOG is environmental protection (division 05). The detailed breakdown of environmental protection is based upon the CEPA. Table 22 shows the relationship between the groups of the COFOG division 05, CEPA classes and gives some indications on the corresponding NACE classes (even though not 100% of the indicated NACEs correspond to the respective COFOG / CEPA: there cannot be a perfect match between COFOG / CEPA (purpose) and NACE (product characteristics, processes, technology) classifications).

Table 22 also indicates which CEPA classes or groupings of CEPA classes are mandatory under Regulation (EU) No 691/2011 for general government units (Table 1).

Table 22: Correspondence between COFOG, CEPA and NACE classifications

COFOG 05 (Environmental Protection)	CEPA 2000	NACE*	Mandatory**
05.1 Waste management	3. Waste management	38.1 & 38.2; 39; 81.29	X
05.2 Waste water management	2. Wastewater management	37	X
	1. Protection of ambient air and climate	39	
05.3 Pollution abatement	4. Protection and remediation of soil, groundwater and surface water	39	X
	5. Noise and vibration abatement	43.29; 71.20	
	7. Protection against radiation	38.12; 38.22	
05.4 Protection of biodiversity and landscape	6. Protection of biodiversity and landscapes	91.04	X
05.5 R&D environmental protection	8. Research and development	72	
05.6 Environmental protection n.e.c.	9. Other environmental protection activities	94.12; 94.99	X

* see also Annex 1

** for general government

NACE 38.12 includes the collection of nuclear waste and 38.22 the treatment, disposal and storage of radioactive nuclear waste including treatment and disposal of transition radioactive waste, i.e. decaying within the period of transport, from hospitals and encapsulation, preparation and other treatment of nuclear waste for storage

NACE 39 includes the decontamination of industrial plants or sites, including nuclear plants and sites

⁽⁴⁷⁾ See Eurostat COFOG 1999; the official version of COFOG is to be found on the [United Nations Website](#)

Notes on some of the COFOG division 05 groups

05.1 Waste management

This group covers collection, treatment and disposal of waste. It includes sweeping of streets, squares, paths, markets, public gardens, parks, etc., activities classified in the NACE 81.29. It therefore records expenditure larger than those related to the activity of general government's units classified in NACE 38.1 + NACE 38.2.

05.3 Pollution management

This group covers activities related to ambient air and climate protection, soil and groundwater protection, noise and vibration abatement and protection against radiation. It therefore corresponds to the grouping of CEPA 1, 4, 5 and 7. When the available information does not allow separating out activities of NACE 39 that fall under CEPA 3 and the ones that fall under CEPA 1 or CEPA 4, it is suggested to record all NACE 39 under CEPA 4.

Components of government expenditure

Table 23 summarizes the data collected in the ESA 2010 TP Table 11, indicating the correspondence with the EPEA characteristics.

COFOG data directly provide four of the characteristics asked in the EPEA Table 1, of which two are mandatory: P51G_NP.1 and P3_EPS.1 and two other are voluntary: compensation of employees D1.1 and intermediate consumption P2.1.

Furthermore, in the domain of environmental protection it could be considered that the characteristic "Other taxes on production payable + Current taxes on income, wealth, etc. + Adjustment for the change in pension entitlements" mainly corresponds to other taxes on production (D29).

Table 23: Correspondence between COFOG variables and EPEA characteristics

COFOG (variables relevant for EPEA)	code	EPEA
Gross capital formation + Acquisitions less disposals of non-produced non-financial assets	OP5ANP	
Gross capital formation	P.5	
Gross fixed capital formation	P.51g	P51G_NP.1
Acquisitions less disposals of non-produced non-financial assets	NP	
Intermediate consumption	P.2	P2.1
Other taxes on production payable + Current taxes on income, wealth, etc. + Adjustment for the change in pension entitlements	D.29 + D.5+ D.8	(D29)
Compensation of employees	D.1	D1.1
Transfers (see below)	various	
Final consumption expenditure	P.3	P3_EPS.1

Transfers

Table 24 gives the detail of selected transfers reported in COFOG statistics. Some of these data may be used the compilation of EPEA Table 6.

- Subsidies;
- Other current transfers;
- Capital transfers.

Social transfers in kind – purchased market production are also useful because they partly enter into the calculation of the final consumption of general government.

Table 24: Transfers in COFOG relevant for EPEA

COFOG: list of variables relevant for EPEA (transfers)	Code	EPEA Q
Subsidies	D.3	
Other current transfers	D.7	D3_D7_D9
Capital transfers	D.9	2_D99_PA
of which investment grants	D.92	Y_GG.6
Social transfers in kind – purchased market production	D.632	

Care should be taken that in ESA 2010 TP COFOG data are not consolidated between general government subsectors except for D.7 and D.9, which means that the reported value is the sum of the values over general government subsectors. Instead EPEA transfers data are consolidated i.e., net of intergovernmental transfers.

Constraints and limitations of the COFOG data

COFOG data are the basis for evaluating three mandatory characteristic (P51G_NP.1, P3_EPS.1 and D3_D7_D92_D99_PAY_GG.6) and two voluntary characteristics (P2.1 and D1.1). Moreover the latter may be used as a basis for the calculation of EMP.1

However EPEA compilers should be aware of some limitations of COFOG data:

- They do not cover revenues and consumption of fixed capital;
- They may not cover all environmental protection expenditure or they may include expenditure different from environmental protection, e.g. resource management expenditure.

These two issues are developed in more detail next.

a) COFOG does not cover revenues and consumption of fixed capital

As COFOG data only cover expenditure of general government units, they do not provide directly the value of market and non-market output. However COFOG data give the value of general government's final consumption expenditure (P3); as explained in Box 5, in order to be able to calculate the final consumption expenditure of general government COFOG's compilers must know more items than those reported under the ESA transmission programme and in particular the value of total and market output.

EPEA compilers should ask COFOG compilers which data they use for this calculation. When no other data are available, revenues may be considered as a proxy of market output.

Box 5: Extract from the COFOG manual

The components of final consumption (P3) in terms of economic categories are:

- Government output (P.1), which is the sum of:
 - Compensation of employees (D.1)
 - Intermediate consumption (P.2)
 - Taxes on production (D.2) less subsidies received (D3)
 - Consumption of fixed capital (P51c)
 - Net operating surplus of market establishments (B.2n)

Less:

- Market output (P.11)
- Output for own final use (P.12)
- Payments for non-market output (P.131)

Plus:

- Social transfers in kind via market producers (D.632)

Note that for European Union countries “Social transfers in kind via market producers (D.632)” are nil in the environmental protection domain, according to Eurostat database General government expenditure by function (COFOG) [gov_10a_exp]. This item will be neglected in the following. Therefore final consumption expenditure (P3) corresponds to P.13 (non-market output) less partial payments for non-market output (P.131).

Source: Eurostat 2011 Manual on sources and methods for the compilation of COFOG Statistics - Classification of the Functions of Government (COFOG)

In some cases (COFOG 05.01 – CEPA 3 or COFOG 05.02 – CEPA 2) it is possible to use data from industry statistics (NACE 37 and 38.1+38.2) with COFOG variables D1 and P2 to estimate the general government part. Some elements to be added or subtracted may be roughly estimated (e.g. P.11, P.131) using some expert information or be assumed to be zero (e.g. P.12) if no specific statistical information is available.

b) Coverage issues

The COFOG function 05 may not cover all expenditure on environmental protection:

COFOG classifies all expenditure under one and only one function and in some cases COFOG division 05 does not include the total amount of the environmental protection expenditure due to the existence of multi-purpose activities or other indivisible units of classification classified under a category other than environmental protection, even if they also relate to environmental protection. Examples are economic aid to developing countries and countries in transition, overall planning and statistical services, agriculture, multi-purpose development projects, housing development or cultural services, etc.

As a consequence, some other positions of the classification may also be relevant to identify environmental protection expenditure, e.g.:

- 01.2.1 Economic aid to developing countries and countries in transition may include aid that is intended to finance projects in the environmental protection area, such as wastewater collection and treatment facilities, or to promote biodiversity protection etc.;
- 01.3.2 Overall planning and statistical services (e.g. the part of statistical offices that relates to environmental statistics);
- 04.2.1 Agriculture (includes compensation, grants, loans or subsidies to farmers in connection with agricultural activities, including organic agriculture, payments for restricting the use of pesticides or encouraging output of a particular crop or for allowing land to remain uncultivated);
- 04.5 Transport (construction of road noise barriers);
- 04.7.4 Multi-purpose development projects;
- 06.1.0 Housing development (includes grants, loans or subsidies to support the expansion, improvement or maintenance of the housing stock, e.g. installation of multi glazed windows);
- 08.2.0 Cultural services (includes operation or support of facilities for cultural pursuits, zoological and botanical gardens, aquaria, arboreta, etc.)

The COFOG function 05 may record expenditure not related to environmental protection:

This is in particular due to the units of classification that are often used for COFOG statistics. In principle, in COFOG the units of classification are individual transactions. But the ministry, agency, or administrative unit might be the *de facto* unit of classification for most outlays where all the outlays are given the same COFOG code. It may happen that administrative units in charge of general

environmental policy are classified in environmental protection and their expenditure fully reported under division 05, even when they cover e.g. some resource management activities.

- Finally COFOG data group expenditure related to CEPA 1, CEPA 4, CEPA 5 and CEPA 7 under only one position: 05.3 pollution abatement. Whereas this is not a problem for the mandatory reporting, in which CEPA 1, CEPA 4, CEPA 5 and CEPA 7 are to be reported together, this is not the case for voluntary reporting in which CEPA should be reported separately.

This means that for some countries COFOG analyses may be too rough and not sensitive enough for EPEA compilation. EPEA compilers should collaborate with the department in charge of Public Finances statistics, and use of budget analysis to identify all items relevant for environmental protection and classify these items by CEPA classes.

Complementing COFOG data with general government finance data

COFOG data (government expenditure by function) are only part of government finance statistics. Other data can be more complete, in particular record revenues. Table 25 shows some of the items of government finance statistics as they are presented in the “government revenue, expenditure and main aggregates” (Eurostat online data code gov_10a_main) based on Table 2 “main aggregates of general government” of the ESA 2010 TP.

Table 25: Transactions recorded in the main aggregates of general government table

Transaction	
P.1	Output
P.11+P.12	Market output and output for own-final use
P.13	Non-market output
P.131	Payments for non-market output
P.132	Non-market output, other
P.2	Intermediate consumption
D.1p	Compensation of employees, payable
P.51c	Consumption of fixed capital
B.2n	Net operating surplus
D.21r	Taxes on products, receivable
D.211R	VAT, receivable
D.29p+D.29r	Other taxes on production, payable & receivable
D.3p	Subsidies, payable
D.31p	Subsidies on products, payable
D.39p+D.39r	Other subsidies on production, payable & receivable
D.7p+D.7r	Other current transfers, payable & receivable
D.92R+D.99r	Other capital transfers and investment grants, receivable
D.9p	Capital transfers, payable
D.92p	Investment grants, payable
P.51g	Gross fixed capital formation
NP	Acquisitions less disposals of non-produced non-financial assets
P.3	Final consumption expenditure

Public finance statistics are the basis for government statistics; some countries use data from public finance statistics for selected environmental functional areas e.g. to obtain data for the government

sector for CEPA 2 and 3. The extra evaluation provides different kinds of expenditures and revenues that can be allocated to these CEPA classes (see for example Germany)⁽⁴⁸⁾.

4.2. Structural Business Statistics

Structural business statistics (SBS) describe the structure, conduct and performance of economic activities, down to the most detailed activity level. SBS has EU legal basis.⁽⁴⁹⁾ They cover all activities of the business economy with the exception of agricultural activities and personal services. SBS data are available at class level (four digits), which is more detailed than standard national accounts data. In particular for specialist producers in NACE 37-39 there is a separation between sewerage (37) and remediation activities (39), but also of waste management activities between waste collection (38.1), waste treatment and disposal (38.2) and materials recovery (38.3). SBS have annual periodicity. Preliminary data are normally available 10 months after the end of the reference year and definitive data within two years.

The most important features of SBS are better NACE breakdowns than national accounts and the collection of environmental variables for EPEA. If national accounts data are not available at a more detailed NACE level than published e.g. with the ESA 2010 TP, EPEA compilers can use additional detail from SBS to split up the national accounts data. However, national accounts are advantageous over SBS because the definition and valuation of the EPEA variables (e.g. output) follows ESA 2010 and also because national accounts include exhaustive adjustments (e.g. for missing units, fraud, black economy etc.).

For sewerage (CEPA 2) and waste management (CEPA 3) it is therefore preferable, whenever possible, to use national accounts data supplemented by the more detailed SBS; for these domains EPEA compilers should avoid doing again the work of national accounts compilers.

SBS data are collected at the level of enterprises, which may be a limitation in particular when comparing with national accounts data which are generally compiled on the basis of local KAUs for presenting data by industry. However some of the SBS characteristics must be compiled at the level of kind-of-activity units.

The SBS regulation defines several modules for reporting of data; the 'common module' applies to activities of Sections B to N and division 95, whereas detailed modules apply for various groupings of NACE: industry, trade, construction, business services, etc. Within the detailed industry module (sections B to E) additional characteristics are added, in particular as concerns environmental protection.

The EU legal basis for business statistics, including SBS, is under review at the time of this writing. The existing legislation will be replaced by a framework regulation on integrated business statistics (FRIBS). This will be an overhaul revision of how business statistics are produced in Europe. This may or may not have effects on SBS as data source for EPEA. In principle, the 'common module' is not expected to be affected (section 4.2.1) but changes are expected in the environmental variables (4.2.2.).

Box 6: Consequences of FRIBS for EPEA

The Regulation on structural business statistics is going to be replaced by the future Framework Regulation for Integrating Business Statistics (FRIBS), currently under preparation. It will probably enter into force in 2018. The date for the 1st data transmission under FRIBS is still in negotiations.

It has been noted that the amendment of Regulation (EU) No 691/2011 in 2014 (Annex IV on EPEA)

⁽⁴⁸⁾ Federal Statistical Office of Germany (2015) Economy wide environmental protection expenditure accounts for Germany

⁽⁴⁹⁾ See [Regulation \(EC\) n° 295/2008 of the European parliament and the council of 11 March 2008 concerning structural business statistics](#) and [Commission Regulation \(EC\) No 250/2009 of 11 March 2009](#)

created a double reporting obligation of certain environmental protection variables as this obligation already existed in the SBS Regulation (295/2008). Double reporting from the Member States to the EU is to be avoided, as a question of matter. For this reason the upcoming FRIBS will not include those environmental protection variables for transmission to Eurostat under SBS.

It must be made clear that the goal of those changes is not to remove the statistics based on those environmental protection variables but to eliminate the current duplication of obligation in two different legal acts. The legal changes for SBS in FRIBS mean that countries must only transmit those variables to Eurostat once, namely through the data collection under Regulation (EU) No 691/2011.

The SBS regulation (and FRIBS) creates an obligation to report certain data to Eurostat, but does not impose any particular obligation to collect the data in a certain business survey. Countries are free to collect the data through a special survey or a combination of surveys and administrative sources.

Countries circumstances are different and typically fall under three groups:

- Some countries have specialised surveys on EP, in order to cover the needs of reporting data under SBS Regulation and Regulation (EU) No 691/2011. Those specialised surveys are not part of the general-purpose business survey that is the backbone of SBS reported data. These surveys should continue to collect the data because the reporting obligation under Regulation (EU) No 691/2011 stands. Those countries were so far obliged to report these data twice. In the future they can use the data only for the data reported under Regulation (EU) No 691/2011.
- Some countries collect the EP variables using the general-purpose business survey that is the backbone of SBS reported data and they intend to continue collecting those variables in the same way in the future, even if there is no EU obligation in FRIBS. Those countries use those data to transmit under Regulation (EU) No 691/2011 and for national purposes.
- Some countries collect the EP variables from the general-purpose business survey that is the backbone of SBS reported data. If they want to drop these variables from SBS, they must introduce a specific survey, or collect the data by some other means for the reporting obligation under Regulation (EU) No 691/2011.

All in all, the legal changes in FRIBS should not undermine the statistical sources to produce EPEA.

In the long term, one way of limiting dependency of EPEA on SBS is enhancing the use of EGSS, in particular in the context of an integrated compilation system as described in Annex 5.

4.2.1. SBS data under the 'common module'

SBS characteristics useful for compiling EPEA accounts

The main SBS characteristic of interest for the determination of output of corporations is production value. This characteristic (12 12 0) is defined as follows:

“Production value measures the amount actually produced by the unit, based on sales, including changes in stocks and the resale of goods and services. The production value is defined as turnover, plus or minus the changes in inventories, minus the purchases of goods and services for resale, plus capitalized production, plus other operating income (excluding subsidies). Income and expenditure classified as financial or extraordinary in company accounts is excluded from production value”.

The production value is close to the output as defined in national accounts and therefore a proxy of the EPEA characteristic P11. Use of the production value is preferable to the use of the **turnover** characteristic (12 11 0) which includes the value of the resale of products without transformation and excludes the capitalised production. This characteristic is also to be compiled at the level of kind-of-activity units e.g. for industry.

SBS also collects data on:

Personnel costs (13 31 0): personnel costs are defined as the total remuneration, in cash or in kind, payable by an employer to an employee. They include taxes and employees' social security contributions retained by the unit as well as the employer's compulsory and voluntary social contributions. This characteristic is a proxy for the EPEA characteristic D1.

Gross operating surplus (12 17 0): gross operating surplus can be calculated from the value added at factor cost less the personnel costs.

Gross investment in tangible goods (15 11 0): it corresponds to investment during the reference period in all tangible goods. Included are new and existing tangible capital goods as well as non-produced tangible goods such as land. This characteristic is also to be compiled at the level of kind-of-activity units.

Sales of tangible investments goods (15 21 0): it corresponds to the value of existing tangible capital goods, sold to third parties. This characteristic is not to be reported under the common module but only for some detailed modules of which industry, trade and construction.

Gross investment in tangible goods (15 11 0) less Sales of tangible investments goods (15 21 0) is a proxy of the EPEA characteristic P51G_NP (gross fixed capital formation plus net acquisition of non-produced non-financial assets). The code of this characteristic in the Eurostat SBS database [sbs_na_ind_r2] is 15 25 0.

Number of persons employed (16 11 0): the number of persons employed is defined as the total number of persons who work in the observation unit (inclusive of working proprietors, partners working regularly in the unit and unpaid family workers working regularly in the unit), as well as persons who work outside the unit who belong to it and are paid by it (e.g. sales representatives, delivery personnel, repair and maintenance teams). This characteristic is also to be compiled at the level of kind-of-activity units e.g. for industry.

The number of employees (16 13 0): the number of employees is defined as those persons who work for an employer and who have a contract of employment and receive compensation in the form of wages, salaries, fees, gratuities, piecework pay or remuneration in kind.

Number of employees in full time equivalent units (16 14 0): it is the total hours worked divided by the average annual number of hours worked in full-time jobs within the economic territory. Figures for the number of persons working less than the standard working time of a full-year full-time worker should be converted into full time equivalents, with regard to the working time of a full-time full-year employee in the unit. This characteristic corresponds to the EPEA characteristic EMP.

Other SBS characteristics collected in the detailed industry module may be interesting for EPEA compilation such as 13 11 0 Total purchases of goods and services less 13 12 0 Purchases of goods and services for resale in the same condition, which is a proxy of EPEA characteristic P2.

The module for business services (all activities within the coverage of divisions 62, 69, 71, 73 and 78 and groups 58.2, 63.1, and 70.2, of NACE Rev. 2) collects turnover by CPA products, which may help for assessing the output in some NACE activities relevant for EPEA, e.g. 71.20 technical testing and analysis.

For those CEPA that rather closely correspond to one or several classes of the NACE (e.g. CEPA 2 and NACE 38.1+38.2 and CEPA 3 and NACE 37), SBS data are useful for EPEA compilation.

However, as shown in the table below for NACE 37-39 industries, SBS results for turnover or production are different from national accounts.

Comparing SBS and national accounts

In all countries output estimates according to national accounts are higher than production according to SBS.

Table 26: Comparison of SBS and national accounts data, 2010 (million EUR)

	SBS production data						NA Supply table		NA output less SBS
							NACE 37 -39		
	E37	E38.1	E38.2	E38.3	E39	Total	Total output	of which P13	
Denmark	1 129	713	683	485	5	3 015	3 882	n.a.	867
Germany*	10 247	8 011	7 956	8 409	377	35 000	41 469	0	6 469
France	2 490	4 883	5 073	10 446	620	23 511	26 412	0	2 901
Italy	1 763	10 183	4 175	8 230	800	25 151	33 555	n.a.	8 404
Hungary	199	275	367	167	67	1 074	1 294	126	220
Netherlands	638	2 336	1 843	1 915	372	7 105	7 117	78	12
Austria**	547	1 347	594	704	11	3 203	5 908	0	2 705
Poland	1 497	1 645	476	1 166	62	4 844	6 013	372	1 169
Portugal	209	328	527	487	3	1 553	2 702	192	1 149
Slovakia	20	200	165	94	7	486	560	27	74
Sweden	366	1 368	286	1 769	28	3 818	3 846	0	28
United Kingdom	3 005	6 535	3 136	8 631	216	21 522	31 022	7 245	9 500
Norway	123	1 122	337	898	40	2 520	3 927	0	1 407

*) Turnover data for Germany instead of production

**) 2011 data for Austria

Source: Eurostat (SBS: online data code sbs_na_ind_r2; NA: online data code naio_10_cp15); extracted on 04.09.15 and 17.08.15 respectively

In the case of the United Kingdom, this difference is in great part explained by the non-market output by non-market producers in NACE 37-39. Other explanation may be that the units are different in SBS (enterprises) and national accounts (local KAUs): national accounts may classify in NACE 37 local KAUs of enterprises classified by SBS in NACE 36. Another explanation may be the coverage of some categories of market public producers; when they are classified in the general government institutional sector they may be not included in SBS statistics. Finally SBS do not cover all units whereas national accounts make adjustments for missing units, thresholds and other exhaustiveness issues (Germany 2015).⁽⁵⁰⁾

Whenever using SBS data, EPEA compilers should strive to make conceptual adjustments to align to national accounts principles if it can have a significant impact and adequate data sources are available. Contact with national accounts compilers is therefore necessary to understand the differences between national accounts values and SBS values and to arrive to the best estimates of output and other characteristics.

4.2.2. SBS environmental characteristics

The SBS regulation requests countries to provide data on environmental expenditure by environmental domains for industries of NACE Rev.2 sections B-E, except for NACE Rev.2 divisions 37, 38 and 39. The level of activity breakdown is NACE section (1 digit level) and division (2 digit level). Expenditure data are to be provided for the following environmental domains breakdown:

- Protection of ambient air and climate (CEPA1);
- Waste water management (CEPA2);
- Waste management (CEPA 3);
- Other environmental protection activities (CEPA 4-9);
- Total.

Two characteristics are to be provided annually:

⁽⁵⁰⁾ Federal Statistical Office of Germany (2015) Economy wide environmental protection expenditure accounts for Germany

Investment in equipment and plants for pollution control, and special anti-pollution accessories (mainly end-of-pipe equipment) (21 11 0); this characteristic is defined as follows:

“Capital expenditures for methods, technologies, processes or equipment designed to collect and remove pollution and pollutants (e.g. air emissions, effluents or solid waste) after their creation, prevent the spread of and measure the level of the pollution, and treat and dispose of pollutants generated by the operating activity of the company.

Included are:

- Investments in distinct, identifiable components supplementing existing equipment, which are implemented at the end of or completely outside the production line (“end-of-pipe” equipment);
- Investments in equipment (e.g. filters or separate cleaning steps) which compose or extract pollutants within the production line, when the removal of these added facilities would not affect in the main the functioning of the production line.

Excluded are:

- Actions and activities beneficial to the environment that would have been taken regardless of environmental protection considerations, including measures that primarily aim at health and safety of the workplace and production security;
- Measures to reduce pollution when the products are used or scrapped (environmental adaptation of products), unless environmental policy and regulation expands the legal responsibility of the producer to cover also the pollution generated by the products when used, or for taking care of the products when they become waste;
- Resource use and saving activities (e.g. water supply or the saving of energy or raw materials), unless the primary purpose is environmental protection: e.g. when these activities aim at implementing national or international environmental policy and are not undertaken for cost savings reasons”.

Investment in equipment and plant linked to cleaner technology (“integrated technology”) (21 12 0); this characteristic is defined as follows:

“Capital expenditures for new or adaptation of existing methods, technologies, processes, equipment (or parts thereof) designed to prevent or reduce the amount of pollution created at the source (e.g. air emissions, effluents or solid waste), thereby reducing the environmental impacts associated with the release of pollutants and/or with polluting activities.

Included are:

- Capital expenditures that involve distinct, separately identifiable (environmental parts of) methods, processes, technologies and equipment. Their main purpose or function is environmental protection by definition and the total expenditure of the (environmental parts of) methods, processes, technologies and equipment should be reported;
- Capital expenditures for methods, processes, technologies and equipment that are integrated with the overall operating activity (production process/installation) in a way that makes it difficult to identify separately the pollution prevention component. In these cases (integrated measures), only the environmental protection fraction of the total investment should be reported.

This fraction corresponds to the additional investment vis-à-vis the capital expenditure that would have been incurred were it not for the environmental protection considerations. Therefore, the alternative for comparison corresponds to the cheapest alternative available to the company with similar functions and characteristics, except for those related to environmental protection.

When the selected option is standard technology and there is no cheaper, less environmentally beneficial alternative available to the company, the measure is by definition not an environmental protection activity, and no expenditure should be reported.”

Those definitions follow the SEEA-CF § 4.72.

One characteristic is to be provided 3-yearly:

Total current expenditure on environmental protection (21 14 0); this characteristic is defined as follows:

“Total current expenditure on environmental protection is the expenditure for operating and maintaining an activity, technology, process, equipment (or parts thereof) designed to prevent, reduce, treat or eliminate pollutants and pollution (e.g. air emissions, effluents or solid waste) or any other degradation of the environment resulting from the operating activity of the company.

Total current expenditure on environmental protection should be reported gross of any cost-offsets resulting from the sale of marketable by-products, savings or subsidies received.

Current expenditure is the sum of “in-house expenditure” and “purchases of environmental protection services”:

In-house expenditure includes all current expenditure on environmental protection except purchases of environmental protection services from other units. It is the sum of labour costs, use of raw materials and consumables including energy costs and payments for operational leasing, for example related to: operation and maintenance of environmental equipment, measurement and monitoring of pollution levels, environmental management, information and education, environmental research and development.

Purchases of environmental protection services include all fees, charges and similar payments to other organizations (outside the reporting unit), public or private, in exchange of environmental protection services related to the environmental impacts of the operating activity of the company. For example, payments for collection and treatment of waste and wastewater, payments related to decontamination of soil, regulatory charges, payments to environmental consultants related to e.g. environmental information, certification or operation of environmental equipment.”

Correspondence with EPEA characteristics and limitations

As concerns EP investment characteristics (21 11 0) and (21 12 0), there is a good correspondence with EPEA characteristics for ancillary activities in Table 3 (corporations: other): INV_EOP.3 (GFCF on specific EP fixed assets, formerly called end-of-pipe technologies) and INV_IT.3 (GFCF on cleaner EP fixed assets, formerly called integrated technologies) and the breakdown by CEPA corresponds to the mandatory part of the questionnaire.

Note however that given the definition of the SBS characteristics it is possible that these two categories do not cover all investments of ancillary EP producers: non-specific equipment, e.g. laptop or car used by the department in charge of environmental protection in an enterprise, may be omitted because they are not specifically “designed” for environmental protection. When no other information is available it may however be acceptable to approximate P51G_NP by the sum of INV_EOP and INV_IT.

As the breakdown by CEPA retained by SBS corresponds to the mandatory part of the EPEA questionnaire Tables 3a (NACE section B), 3b (NACE section C), 3b_Add (specific grouping of divisions of NACE section B), 3c (NACE section D) and 3d (NACE division 36) may be filled in with SBS data. Only data for Table 3e are not available through SBS (however Table 3e is voluntary).

Note however that due to existing thresholds before using SBS data it is necessary to verify their exhaustiveness and possibly correct them.

As concerns current expenditure (21 14 0), only total current expenditure is available through the SBS, whereas the EPEA reporting framework asks separately first for ancillary EP output (simplified valuation legally acceptable) (P1_ANC) as the sum of compensation of employees and intermediate consumption, excluding intermediate consumption of EP services, and secondly for the intermediate consumption of EP services. However in many countries surveys collecting SBS environmental characteristics ask separately for internal current expenditure and purchase of external EP services.

4.3. Environmental accounts

The EPEA are part of the set of monetary environmental accounts following the SEEA-CF framework. Those accounts can be a source of information for the compilation of EPEA.

Some monetary environmental accounts are covered in Regulation (EU) No 691/2011: EPEA, environmental taxes and environmental goods and services sector (EGSS) accounts. The Regulation also refers to a programme of pilot studies to test the feasibility of introducing new modules such as Environmentally Related Transfers (subsidies), Resource Use and Management Expenditure Accounts (RUMEA).⁽⁵¹⁾ Monetary environmental accounts without legal basis are Environmental subsidies and similar transfers (under development, guidelines published, voluntary data collection in place since 2015) and Resource management expenditure accounts (ReMEA; under development, draft guidelines available, no European data collection yet).

4.3.1. Environmental goods and services accounts

Among the monetary environmental accounts, EGSS accounts is the most promising one to serve as data source for EPEA (see Eurostat *EGSS Handbook, 2016 edition*).

EGSS accounts analyse the environmental protection and resource management activities from the supply side, i.e., production of environmental products. The environmental protection expenditure accounts (EPEA) analyse the environmental protection from the use side, i.e. expenditure on environmental protection complemented with information on output, costs of production and transfers. Therefore EGSS and EPEA address environmental activities from complementary angles.

EGSS and EPEA are part of the SEEA-CF standards and are based on national accounts methodology. However they have a different historical path and they serve different needs. For these reasons, in practice, the alignment of EGSS and EPEA on a theoretical level is far from perfect. The table below indicates the main common points and differences between EGSS and EPEA as delineated in the reporting to Eurostat.

⁽⁵¹⁾ As concerns Environmental subsidies and similar transfers Eurostat has already published guidelines and run voluntary data collection in 2015 see: [Environmental subsidies and similar transfers: guidelines](#) For ReMEA draft guidelines exist that can be used by countries that want to test the feasibility

Table 27: main features of EGSS and EPEA compared ⁽⁵²⁾

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

Therefore, the main common features of EGSS and EPEA are as follows:

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

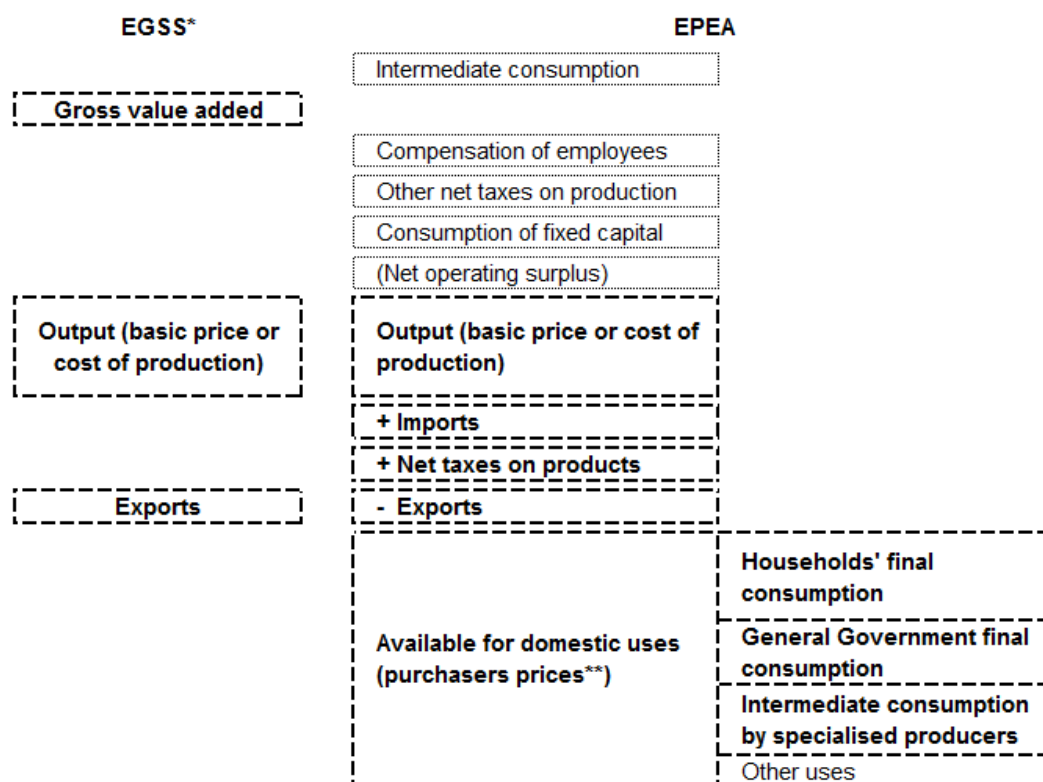
⁽⁵²⁾ for the sake of simplification this table does not distinguish in all cases mandatory features (requested in Regulation (EU) No 691/2011) and voluntary extensions

- Whereas intermediate consumption is not a reporting characteristic in the Eurostat EGSS data collection, it is implicit as it is the difference between output and gross value added, which are both reported. This 'implicit intermediate consumption' is the intermediate consumption by production units engaged in the EGSS. It corresponds to characteristic P2 in EPEA (intermediate consumption for the production of EP services).

The main differences are:

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

Figure 9: Characteristic in EGSS and EPEA



* (specific) environmental protection products (market, non-market, for own final use and ancillary)

** or extra cost (secondary purpose products)

Using EGSS data to compile EPEA

When using EGSS for the compilation of EPEA, three cases may be distinguished:

1. EPEA variables that can be directly obtained from EGSS, provided some conditions are met;
2. EPEA variables for which EGSS can provide support in the estimation process;
3. EPEA variables that can benefit from an integrated estimation framework including EGSS and other monetary environmental accounts.

As regards case 1 above, variables output, exports and employment can be directly obtained from EGSS. Conditions needed for EGSS to be a source for EPEA are:

- EGSS must allow distinguishing environmental protection from resource management, so that only the former are accounted for in EPEA. This is more or less automatic because EGSS follows the classifications CEPA and CReMA, which distinguish EP from RM. Next, EGSS also must disclose specific EP services from other EP products. This may or may not be possible. It may be necessary to distinguish between characteristic and non-characteristic activities too.
- EGSS must calculate not only market output but also non-market output and ancillary output. Only market output is mandatory in the EGSS compilation system.

Table 28: Correspondence between EGSS and EPEA reporting for EP services

EGSS (Environmental protection part)	EPEA
Market output of environmental specific services (+ output for own-final use)	EP market output
Ancillary output	EP ancillary output
Non-market output	EP non-market output

- EGSS must be calculated at CEPA class level or at least allowing a mapping to the CEPA groupings used in EPEA. The mandatory EGSS data collection only requires groupings of CEPA (CEPA 7, 8 and 9 are grouped together, whereas CEPA 1 to 6 are required individually). A mapping based on assumptions may be possible. EPEA compilers may for example use information gathered for EGSS on the EP services corresponding to CEPA classes other than 2, 3 and 4. As EGSS data are presented by NACE they also allow identifying secondary output for products corresponding to those CEPA classes.
- It must be possible to map EGSS figures (typically produced by NACE category) by institutional sectors for EPEA reporting. This mapping may use assumptions, e.g. that all EP non-market output belongs in sector of general government and NPISHs. It may also be possible to map some industries for which EGSS provides details with the specialist and non-specialist units in the corporation sector.

Regarding case 2 above (i.e., EPEA variables for which EGSS can provide support in the estimation process), this includes the EPEA variable intermediate consumption (EPEA characteristic P2). This characteristic can be derived in EGSS as the difference between output and gross value added.

Regarding case 3 above (i.e., EPEA variables that can benefit from an integrated estimation framework including EGSS and other monetary environmental accounts), this includes the following EPEA variables: compensation of employees, GFCF and VAT and other taxes less subsidies on EP services (D21-D31). Those are all variables related to environmental production activities. An integrated compilation system has the potential to improve consistency, e.g. of employment (for EPEA and EGSS) and compensation of employees (for EPEA), of intermediate consumption (for EPEA) and GFCF (for EPEA and implicit in EGSS), etc. An integrated compilation system also can improve consistency of output and imports/exports estimates, increase efficiency of production work in the statistical offices and other advantages. Annex 5 "Integrating EPEA and other environmental accounts" further develops those points.

4.3.2. Environmental subsidies and similar transfers

Regulation (EU) No 691/2011 makes reference in article 4 (pilot studies) and article 10 (report and review) to the development of new modules and among other work areas, to environmental related transfers (subsidies and similar transfers) as a future area for inclusion. In this context Eurostat published in July 2015 Guidelines on "Environmental subsidies and similar transfers –ESST" ⁽⁵³⁾ and launched a pilot data collection.

The ESST data collection covers, at least in principle, environmental protection and resource management.

In the ESST data collection environmental protection transfers are cross-classified:

By categories of transfers: Total, current, subsidies, other current, capital, including a "taxes abatements" item

By CEPA: CEPA 2, 3, 6, 8, 9, sum of 1+4+5+7 with possible filling- in for CEPA 1, 4, 5, 7 separately

By payer / receiver:

Transfers paid by the rest of the world

⁽⁵³⁾ See <http://ec.europa.eu/eurostat/fr/web/products-manuals-and-guidelines/-/KS-GQ-15-005-EN-N>

Transfers paid by general government, of which to:

- general government
- corporations
- households
- NPISH

In the last version of the ESST questionnaire, transfers are reported individually for CEPA 2, 3 and 6 whereas CEPA 1, 4, 5 and 7 grouped together as well as CEPA 8 and 9. Transfers paid by general government to corporations must also be distributed according the following NACE breakdown: A, B, C, D, E, F, G, H and I-U.

Comparing environmental transfers in the ESST module and in EPEA

When focusing on environmental protection domains, environmental subsidies and similar transfers are defined in the same way in EPEA and ESST: transfers intended to support activities which protect the environment and the use of environmental protection products. In both accounts the core of data to be reported is constituted by transactions classified as current (D.3: Subsidies and D.7: other current transfers) or capital transfers (D.92 Investment grants and D.99 Other capital transfers) according to ESA 2010.

ESST has connections with two aspects of EPEA. First is the transitions from production of EP services to uses of EP services (questionnaire Table 4), in particular for the change of valuation from basic prices to purchaser's prices. Subsidies on EP services is one element in that calculation (EPEA characteristic D.21-D.31.4). Secondly, both ESST and EPEA collect data about EP transfers.

Therefore, there are correspondences and complementarities between the flows recorded in ESST and in EPEA. Whenever the collection is coordinated the two modules may provide more detailed information, for example comparison of total transfers received by corporations (EPEA) and transfers paid by general government to corporations (ESST) may give information on the transfers from the rest of the world to corporations.

There are however small differences which relate to the classification of sectors: NPISH are separated from general government in ESST and to the consolidation of transfers: transfers are not consolidated in ESST but are consolidated in EPEA. Finally ESST includes D6 in current transfers. Table 29 compares the data on transfers to be reported under EPEA and ESST.

Because ESST is a less mature conceptual framework and data collection than EPEA, there is more room to adjust ESST to better integrate with EPEA and EGSS. This is one consideration for the future.

Table 29: Comparison of transfers in EPEA and environmental subsidies

		Transfers paid by		Total received
		General government	Rest of the world	
Transfers received by	Corporations	T		X
	General government	T	X	
	NPISH	T		
	Households	T		X
	Rest of the world	X / T	-	
Total paid		X / T	X / T	

X: EPEA

T: ESST

Only mandatory and total transfers

4.4. Other data sources

4.4.1. Other data sources about producers of environmental protection services

COFOG and SBS environmental characteristics are the main data sources as concerns general government and ancillary environmental protection activities. National accounts supply-use tables and SBS provide data on the producers in the NACE 37-39 industries, which correspond to the most important producers of market and non-market EP services of CEPA 2 and 3.

However these data sources do not cover all environmental protection activities of CEPA 2 and 3 (e.g. street sweeping classified in NACE 81.29 or consulting activities in the waste water or waste management domains) nor environmental protection activities of corporations in the other CEPA classes (e.g. installation of noise barriers, treatment of high level radioactive waste, remediation of polluted soil, etc.). Therefore there is a need to identify producers in these activities outside NACE 37-39.

This work can be done in the context of the compilation of EGSS, which also requires identifying producers in environmental protection (and resource management) activities. See *Eurostat EGSS handbook, edition 2016*.

This work can also be done independently from EGSS, in countries which choose to do it so. This is explained here. This work can start from the list of EP activities and the corresponding NACE and CPA classes (see Annex 1), or from the EGSS operational lists of activities and products (focusing on the entries about environmental protection and ignoring the entries about resource management). Thus it is possible to identify the corresponding producers using statistical and administrative sources, such as business and statistical registers.

However the population of producers identified this way may be for many of the NACE classes more numerous than the true number of EP services producers as the activity classes used to identify them are often too broad. The identification must therefore be complemented using multiple sources of information, such as picking out EP producers from media (e.g. internet pages), industry associations lists and registers, environmental trade shows and fairs, "yellow pages", etc., looking for

environmental protection activities and producers.

Specific surveys may be carried out for certain NACE classes to identify producers of EP services. The selection of classes to be surveyed should take into account the expected costs and benefits. Some NACE classes may be considered a-priori as not contributing significantly to EPEA and can therefore be not surveyed.

Box 7: Business registers

Business registers (see Regulation (EC) No 177/2008 of the European Parliament and of the Council of 20 February 2008 establishing a common framework for business registers for statistical purposes) include information on the active population of:

- Enterprises carrying on economic activities contributing to the gross domestic product (GDP);
- Their local units;
- The legal units of which those enterprises consist and enterprise groups (association of enterprises bound together by legal and/or financial links).

The characteristics recorded in the registers for the units are, for example:

- Identification characteristics: ID numbers, names, addresses;
- Economic/stratification characteristics: economic activity (NACE), employment, turnover, legal form;

These registers are used:

- As a tool for the preparation and co-ordination of surveys;
- As a source of information for statistical analysis of the business population and its demography;
- To establish links with administrative sources;
- For the identification and construction of statistical units.

4.4.2. Specific surveys on environmental protection expenditure

Almost all countries organize surveys on EP expenditure at least for collecting the mandatory SBS environmental characteristics. These surveys may cover only the characteristics, the NACE and the CEPA asked in the SBS regulation or they may cover other NACE, more detailed items and the full breakdown of CEPA and be extended to government units engaged in production of EP services as their principal activity.

Surveys are particularly important to estimate intermediate consumption of EP services by the various industries and for the disaggregation of COFOG group 05.03 data according to CEPA 1, CEPA 4, CEPA 5 and CEPA 7. They are also useful to obtain data on the value of related non-EP outputs and employment.

Box 8: Example of the surveys in Hungary

Specific surveys serve as one of the major data sources for the compilation of the Hungarian environmental protection expenditure accounts. There are two kinds of specific surveys conducted

since early 2000s. One of them concentrates on the environmental protection related expenditures, including internal current expenditures and investments, the other one focuses on the production of environmental related products and the provision of environmental services.

The first survey, whose main objective is to collect data on ancillary activities, covers all NACE and asks for internal current expenditure, purchases of environmental protection services by environmental domain and investment as well as related non-EP output and number of employees with environmental related activities, ownership structure (state, foreign, etc.).

The second one is a survey on environment industry conducted since 2002. Data are collected on the revenues from sales of environmental products, environmental services and environmental protection related construction activities by environmental domains. Separate data are collected on the production of cleaner technologies and products.

Data suppliers of the questionnaire are economic organizations (according to Business Register). The list of data suppliers are revised annually by using the following sources of information:

- Data suppliers of other surveys (e.g. surveys on waste and wastewater collection and treatment);
- List of organisations from the Association of Producers of Environmental Products and Services;
- The organisations that indicate that they produce environmental products or services in the survey on environmental expenditure.

As of 2013, the following information can be obtained from the results of the environmental industry data collection:

- Total net revenue from the sales of environmental industrial sales (production, services and construction and installation activities);
- Export revenue from the sales of environmental industrial sales (production, services and construction and installation activities);
- Employment connected to the production/services in eco-industry.

Data can be broken down by CEPA classes and by NACE at two-digit level. Results can be used to calculate output and EP employment by principal producers of EP services in the corporate or government sector.

Source: Hungarian Central Statistical Office (2015) Environmental Protection Expenditure Accounts in Hungary Final report

4.4.3. Balance of Payments

The Extended Balance of Payments Services classification (EBOPS 2010) includes a position for waste treatment and de-pollution services (10.3.2.1). According to the Correspondence table between EBOPS and CPA⁽⁵⁴⁾ this position corresponds to CPA 37, 38 and 39.

The Eurostat dataset "International trade in services (BPM6)" [bop_its6_det] presents the imports and exports of waste treatment and de-pollution services (including CPA 38.3).

Amongst the responding countries, only four countries have exports above 100 MEUR and for 14 countries the value of exports is less than 20 MEUR (of which 8 less than 10MEUR) (see Table 30).

⁽⁵⁴⁾ See Correspondence table between the Statistical Classification of Products by Activity in the European Economic Community (CPA 2008) and the Extended Balance of Payments Services Classification (EBOPS 2010), Eurostat: RAMON - Reference And Management Of Nomenclatures

Table 30: Trade in waste treatment and de-pollution services, annual average 2012-2014 (million EUR)

	Debit	Credit
Netherlands*	200,5	255,3
Germany	107,3	180,0
Sweden	22,0	162,4
Belgium	133,7	158,0
France	116,7	62,0
Denmark	17,1	53,7
Poland	14,4	28,2
Slovakia**	6,7	21,8
Czech Republic	17,1	19,0
Hungary	11,1	13,8
Italy	143,3	12,7
Luxembourg	15,7	12,7
Romania**	9,5	11,9
Bulgaria	6,7	11,5
Slovenia	9,0	1,7
Estonia	1,0	1,6
Croatia	3,2	1,4
Lithuania	1,6	1,1
Ireland	0,0	0,0
Greece	0,0	0,0
Latvia	0,0	0,0
Malta	0,0	0,0

(*) 2014 data for the Netherlands

(**) Average 2013-2014 for Slovakia and Romania

Source: Eurostat (online data code `bop_its6_det`); updated: 01.06.16; extracted on 13.06.16

The main EP service traded is waste management (e.g. payments for waste treated in other countries). The value of imports and exports may be estimated based on physical data (on volumes) and average prices. There are physical data available under the Basel convention for all countries concerning dangerous waste. Some countries also have data on cross-border flows of mixed household waste. There are no data for inert wastes but it can be assumed that the monetary values involved are very small given the low prices for the treatment of such waste and the high transport costs.

A difficulty is to assess imports and exports of other EP services, e.g. environmental consulting services (CPA 74.90.13) which are included with many other "Scientific and other technical services" in the position 10.3.1.3 of the EBOPS.

4.4.4. Household expenditure surveys

Household final consumption of environmental specific services

In the mandatory part of the questionnaire the household final consumption of EP services is only asked for CEPA 2 and 3.

When the national accounts use table is not sufficiently detailed, e.g. when it does not distinguish

products of the CPA 37 and 38.1+38.2, household surveys may provide data on the final consumption of households on waste water and waste collection and treatment services, corresponding to CEPA 2 and CEPA 3.

All countries conduct surveys on the final consumption expenditure of households. Data are organised according to the COICOP classification (classification of individual consumption according to purpose). Group 04.4 of the COICOP regards “water supply and miscellaneous services relating to the dwelling”. The group is divided into:

- 04.4.1 - Water supply;
- 04.4.2 - Refuse collection;
- 04.4.3 - Sewage collection;
- 04.4.4 - Other services relating to the dwelling n.e.c.

However survey results must be used with caution: in some cases payments for refuse collection are not separated from the rents paid and payments for sewage are included in the water supply bill. In all cases EPEA compilers must ask national accounts compilers on the available data.

Final consumption of environmental protection products other than EP services

The EPEA questionnaire collects the household final consumption of EP products other than EP services i.e. specific EP goods (=connected goods) and cleaner EP goods (=adapted goods).

General household consumption surveys rarely provide data sufficiently detailed to allow identifying household expenditure on specific goods and cleaner goods. However some cases exist. For example, using number of registrations in the vehicle register for hybrid cars and the Household Budget Survey for organic foods, Statistics Sweden was able to evaluate how much households spend on purchasing hybrid cars and on organic food. However it was not possible to estimate the extra cost of these purchases. Therefore Sweden included the full expenditure of the hybrid cars and organic food in the EPEA tables.⁽⁵⁵⁾

4.4.5. Sources for NPISH

The EPEA reporting framework groups NPISH together with general government. However in COFOG or national accounts data NPISH are not included in the general government institutional sector, except for these NPISH which are under the control of the general government. Therefore data on NPISH must be estimated and added to general government data in the questionnaire Table 1.

Similarly to the general government, there is a classification of the purposes of non-profit institutions serving households (COPNI). However accounts for NPISH are less developed than for other institutional sectors and NPISH accounts are generally aggregated over all divisions of the COPNI. Furthermore where NPISH are not important they are aggregated with households following ESA 2010 (§ 2.130).

Box 9: Classification of the purposes of non-profit institutions serving households (COPNI)

Division: 08 - Environmental protection

Group: 08.1 - Environmental protection services

Class: 08.1.0 - Environmental protection services

⁽⁵⁵⁾ Statistics Sweden (2009) Environmental Protection Expenditure Accounts in Sweden – a pilot application and analysis Final report to Eurostat

This class covers the following NPISHs:

- Organisations set up to prevent or remedy damage to the environment;
- Associations that seek to protect wild animals or preserve particular species of animals, birds, fish, insects etc.;
- Organisations that seek to preserve forests, wet-lands and areas of natural beauty.

Excluded are the political parties mainly concerned with environment issues (07.1.0); associations that seek to prevent cruelty to domesticated animals (09.1.0).

Group: 08.2 - R&D Environmental protection

Class: 08.2.0 - R&D Environmental protection

This class covers the following NPISHs:

- Organizations that undertake applied research and experimental development on subjects related to environmental protection and trust funds and charitable organizations set up to finance such activities.

Two pieces of information may be used for estimating transactions of NPISHs:

- In some countries budgetary documents list all transfers from general government to NPISHs, which allows first to identify the most important NPISH in the domain of environmental protection and then to estimate the total of central, state or local government environmental protection transfers to NPISH;
- When the most important environmental protection NPISHs are identified, their accounts are to be collected and analysed. From this analysis the average structure of environmental NPISH receipts and expenditure is estimated.

A grossing up factor is then calculated on the basis of general government transfers in the budget and in the sample of NPISH and the full accounts of environmental NPISH estimated.

4.4.6. Labour statistics

Employment data are available from national accounts – by industries level A*64 (37-39), from SBS – by industries (corporations) at the level of NACE classes and from the Labour Force Survey – for NACE 37 and 38-39. National accounts data by A*64 industries are available with a delay of 21 months. Labour Force Survey data are available with a 3 to 6 months delay and SBS preliminary data shall be transmitted with a delay of 10 months.

As shown in Table 31, SBS data cannot be used straight. In general SBS estimates are lower than national accounts estimates as concerns the number of employees. The reasons are the same as for output.

Table 31: Total employment for NACE 37-39 (data for 2010)

	SBS (corporations)		NA	LFS
	number of employees 1000 FTE	number of employees 1000 persons	Employees (domestic concept) 1000 persons	1000 persons
Bulgaria	15,70	16,02	17,19	
Czech Republic	27,60	28,21	35,88	32,6
Denmark	7,72	8,04	9,00	
Germany	138,50		201,00	177,7
Ireland	5,82	6,13	9,44	
Spain	69,30	73,02	91,20	75,1
France	96,18	109,00	130,00	
Croatia	9,47	10,96	12,39	
Italy	119,97	140,88	150,80	183,3
Latvia	4,08	5,04	4,68	
Lithuania	5,69	6,16	5,30	
Hungary	20,92	21,80	23,20	
Netherlands	29,85	32,18	27,00	
Austria	13,92	15,16	18,82	
Portugal	16,45	16,51	26,86	
Romania	43,78	44,09	70,10	
Slovakia	9,07	9,14	11,31	
Finland	5,77	6,31	9,20	
Sweden	12,88	14,00	18,00	
Norway	7,31	7,58	12,00	

Source: Eurostat (online data codes sbs_na_ind_r2, nama_10_a64_e and lfsa_egan_22d); last updates 10.11.15, 10.11.15 and 28.09.15 respectively; extracted on 10.11.15, 10.11.15 and 10.11.15 respectively

In EPEA, employment related to the production of EP services (characteristic EMP: employment) is to be reported in “full time equivalents” (FTE); ESA 2010 § 11.32 defines FTE as 'total hours worked divided by the average annual number of hours worked in full-time jobs within the economic territory'.

Only SBS provide data on employment (employees) in FTE; all other source give data in thousands jobs, thousands persons, thousands hours worked, etc. However the Labour Force Survey collects all the information in number of hours worked and persons employed necessary to derive FTE.

Therefore, there are two approaches to calculate employment estimates in FTE for EPEA:

- Using the ratios between full time equivalents and employees from SBS and applying them to national accounts employment (persons employed) by industry;
- Using the Labour Force Survey: from the variables “Average number of actual weekly hours of work in main job, by sex, professional status, full-time/part-time and economic activity (from 2008 onwards, NACE Rev. 2) - hours” (Eurostat online database lfsa_ewhan2) and “Employment by sex, age, professional status and full-time/part-time (1 000)” (Eurostat online database lfsa_eftpt) it is possible to calculate the ratio between FTE and total employment.

5

Filling-in the tables

Chapter 4 introduced the main data sources and explained how they match with or differ from EPEA definitions and scope. Normally the data sources must be processed and adapted for use in EPEA. Chapter 5 addresses this point. This chapter goes through the EPEA reporting tables explaining in detail how to fill-in them.

Before attempting to fill-in the tables, it is useful to study the organisation of the production of EP services in the country, in particular as concerns waste water and waste management. This will focus the compilation of source data. Possible relevant questions are:

- Who does what?
- What is the role of general government and corporations units in the different domains?
- Who has the responsibility of waste water and waste collection and treatment?
- Is the production of the respective services delegated to public and/or private corporations or are they directly executed by municipalities or local governments? What is the legal form of these municipal units? How are they classified in national accounts?
- What are the consequences of the institutional setting in how the transactions between those units are recorded in economic statistics and national accounts? Are they covered in government finance statistics? Do SBS offer any information?
- Is VAT due on EP services for the output of all units? Which is the tax rate?
- How are the EP services financed: through payments of fees, through transfers from the general government? Are they earmarked taxes?
- Who owns the facilities where the services are produced? Is the owner a (private or public) producer or a local government unit?
- How is the gross fixed capital formation of producers financed: by the producers themselves, by local governments?
- Are there transfers to cover some of the costs of production or gross fixed capital formation?
- Are units classified in NACE 36 involved in waste water management?
- ...

In general, the primary responsibility for environmental legislation and regulation is with the Ministry of the Environment. Other Ministries may also be involved in environmental protection, e.g. Ministries of Agriculture, Energy, Transport, etc. In some federal (or federal-type) countries, the States or lower levels of public administration also have legislative or regulatory tasks. In many countries specialized central government units are involved in the implementation of government policy e.g., national environmental agency, institutes for environmental research and development, agencies for the protection of landscape and biodiversity, etc.

The control or provision of important EP services (waste collection, treatment and disposal or wastewater collection and treatment) is often the responsibility of local governments (municipalities, associations of municipalities). In some countries units of the local government delegate the actual provision of environmental services to private or public corporations. In other countries the local governments themselves provide these services, either directly or through specialized departments. In other domains (noise abatement, air quality control, soil and water protection, etc.) local governments have specific responsibilities they exert through their general services or delegate to specialized departments or public or private institutions.

Private or public corporations are in charge of producing EP services mainly in the wastewater, waste management and sites cleaning up domains. These services are used by households, by other corporations or general government.

Finally, various non-profit institutions may be engaged in environmental protection, mainly about the protection of landscape and biodiversity, or as general environmental lobby groups.

Financing is an important aspect to be investigated. For wastewater and waste collection and treatment the users generally pay charges in return for services rendered. However, in some cases these services are financed via the general budget of local governments. In some countries specific agencies are in charge of collecting taxes and redistributing them as capital grants or subsidies to the entities that provide the services. Financing mechanisms must therefore be studied in detail: transfers between the different levels of government, earmarked funds from which subsidies and capital grants are paid, etc.

Analysis of environmental taxes (who pays taxes, how much, what for?) can be used as a source of indirect information on the financing flows. Table 32 gives an overview of the different situations that may coexist in a country.

Table 32: Map of environment protection activities

Type of unit/type of intervention	CEPA 1	CEPA 2	CEPA 3	CEPA 4	CEPA 5	CEPA 6	CEPA 7	CEPA 8	CEPA 9
General Government & NPISH									
Central and State government									
<u>Ministry of the environment, other ministries:</u> legislation, regulation, collection of taxes, payment of transfers	x	x	x	x	x	x	x	x	X
<u>Central and state government specialised agencies:</u> implementation, payment of transfers, technical aid, etc.	x	x	x	x	X	X	X	X	X
Local governments									
<u>Municipalities/associations of municipalities:</u>									
Control, transfers, collection of fees and taxes ...	x	x	x	x	x	x	x	x	X
Supply of EP services		X	X						
<u>Other local governments, local government specialised agencies and departments:</u> implementation, control, supply, transfers	x	x	x	x	x	X			X
Non-profit institutions serving households:									
Support environmental activities, raise funds, educate, finance, etc.	x	x				X	x	x	
Corporations									
<u>All:</u> purchase of EP services	x	X	X	x	x	x		x	x
<u>Specialist EP and secondary producers:</u> production of EP services		X	X	x				x	x
<u>Other EP producers:</u> internal measures to reduce the environmental impact of their activity, including environmental management, R&D, etc.	X	X	X	x	X	x	x	X	X
Households									
Pay for EP services, pay for specialist EP goods and cleaner RP goods	x	X	X		x				
Rest of the world									
Import or export EP services		x	x	x					
Pay (EU institutions) or receive transfers	x	x	x			x			X

X: typically an important component of activities and expenditure
 x: typically less important but non-negligible component

Another preparatory action is cultivating and maintaining a good cooperation with the departments of National Accounts and Public Finance Statistics.

In many countries the distribution of activities between the general government and the corporations has evolved rapidly in the last ten to twenty years: the private sector is growing in importance due to a trend towards privatisation. In the 'public' sector, more and more activities are undertaken by public enterprises rather than local government departments. This shift has effects in the classifications of the units producing public EP services, like waste water and waste management, in the national accounts and public finance systems.

It is also important to follow the changes in political priorities, as they are beneath the adoption of new laws, the creation of new agencies or government bodies, new waves of environmental investment and new taxes and funding mechanisms, in part e.g. as national reaction to EU Regulations.

Organising the source data for EPEA Tables 1 and 2

The first step to compile EPEA Tables 1 and 2 is preparing a table presenting the output of EP services cross-classified by institutional sector and by NACE. Such a table should cover the main EP services and in particular EP services corresponding to CEPA 2 to 4. This table should be based on all available data sources and use a level of disaggregation consistent with national accounts (supply table at basic prices).

Table 33: Table presenting the supply of environmental protection services

	Institutional sector			Total
	General government	Corporations specialist	Corporations non-specialist	
Output of EP services				
Market	X	X	X	X
Non-market	X	-	-	X
Other output	x	x	X	x

X: typically an important component of activities and expenditure

x: typically less important but non-negligible component

A second step is creating a table presenting the main elements of the production and generation of income accounts for the general government and corporation specialist producers; for the general government the basis may be COFOG data; for specialist producers of the corporations it may be SBS data. The table should ensure consistency with national accounts data by industry.

Table 34: Table presenting the production and generation of income account of environmental protection services producers

	General government	Corporations Specialist producers	Total industry
Total output (EP services and non-EP services)	X	X	X
Intermediate consumption	X	X	X
Compensation of employees	X	X	X
Other taxes less subsidies on production	X	X	X
Consumption of fixed capital	X	X	X
Net operating surplus	X	X	X
Gross fixed capital formation	X	X	X

The rest of Chapter 5 addresses the compilation of the EPEA tables in detail.

5.1. Table 1: general government

Complementing and organising basic data

The main data source is the ESA 2010 TP Table 11 “General government expenditure by function”. However, as indicated in Chapter 4, it is possible that the COFOG division 05 data do not cover all environmental protection expenditure by general government. Therefore, before using COFOG division 05 data, EPEA compilers should verify their completeness and, whenever necessary, complement them with other COFOG divisions that could include environmental protection expenditure. In most cases the corresponding programmes will mainly be transfers and therefore will not affect EPEA Table 1, except possibly in the case of multipurpose development projects and/or housing rehabilitation projects with environmental protection components executed by local government units.

In some cases COFOG 05 data may need other adjustments, e.g. if there is suspicion that resource management expenditure are included in some sub positions of COFOG 05 (Climate protection through energy efficiency programmes, R&D for renewable energy, etc.).

Afterwards general government data should be supplemented with NPISH data. NPISH expenditure might be important in some countries and some CEPA. However the EPEA pilot exercises from the 90s suggest that non-profit institutions did not have at the time very important expenditure (they represented around 1% of total Environmental Protection Expenditure).

Non-profit institutions are active mainly in landscape and biodiversity protection, radiation protection and general administration and education. Although they usually act as lobbying organisations they may also produce other types of services like inventories, measurement, control, etc.

Data on the environmental protection activities of NPISH are seldom directly available in the required format. The first solution is to ask national accountants how they produce their NPISH estimates and whether these can be disaggregated by COPNI. If this is not successful, the method described in 4.4.5 should be attempted.

Ideally when COFOG 05 data have been complemented, a preliminary step to compile Table 1 is to build a table summarising and organizing all data necessary for filling-in the Table 1, as shown in Table 35 “Full general government / NPISH table”.⁽⁵⁶⁾

Table 35: Full general government / NPISH table (by CEPA)

	COFOG division 5 data	subtracting non environmental protection transactions	adding environmental protection transactions classified in other divisions	adding NPISH	Total
P51G_NP					
P1					
P11					
P13					
P2					
D1					
P3_EPS					
Other variables					

5.1.1. Table 1: mandatory part

Table 1: General government and NPISH	CEPA				
	CEPA 2	CEPA 3	CEPA 6	sum of CEPA 1, 4, 5, 7	sum of CEPA 8, 9
(P1.1) EP output ((P11.1) + (P13.1))	X	X	X	X	X
(P11.1) EP market output (including output for own final use)	X	X	X	X	X
(P13.1) EP non-market output (includes P.131 (payments for non-m	X	X	X	X	X
(P51G_NP.1) Gross fixed capital formation *)	X	X	X	X	X
(P3_EPS.1) Final consumption of EP services	X	X	X	X	X
	X				

To be filled in

*) and acquisitions less disposals of non-produced non-financial assets

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P11.1, P13.1 and P1.1: environmental protection market, non-market and total output

These data are available straight from EGSS, provided some conditions are met:

- EGSS can be obtained with a breakdown by institutional sector
- It is possible to disclose the characteristic output on EP
- EGSS has the same CEPA breakdowns as required for EPEA.

An alternative is to produce independent output estimates for EPEA. As indicated in Chapter 4,

⁽⁵⁶⁾ This table and corresponding data will be shortly referred below as the COFOG table /COFOG data

COFOG data do not directly provide the value of market and non-market output of general government units. EPEA compilers should ask if national accountants or government finance statistics compilers have these figures.

P11.1: environmental protection market output

It is noted that this category includes market output and output for own final use.

In some countries government finance statistics provide the receipts from waste and waste water management units of the general government which may serve as an estimate of market output (and partial payments) for the waste water and waste management activities, which represent almost the totality of general government market output in environmental protection.

In other countries, the data on market output can be obtained from national statistical surveys on waste, waste water and other environmental protection expenditure from municipalities.

P13.1: environmental protection non-market output

Non-market output is the sum of the final consumption of general government and payments for non-market output by households or corporations.

Final consumption of general government in EP services is available from COFOG data.

Payments for non-market output are not included in government final consumption but in the consumption (either intermediate or final) of the units that make the payments. An estimate may be available e.g. from government finance statistics or specific surveys. In that case it is possible to determine non-market output as the sum of final consumption of general government and payments for non-market output. Whenever there is an indication that payments for non-market output are not important, the final consumption of EP services is an acceptable proxy for P13.1.

P1.1: total environmental protection output

Whenever the data sources named above are not available, EPEA compilers could start from the production costs as described in COFOG data (intermediate consumption and compensation of employees). Adding to intermediate consumption and compensation of employees an estimate of the consumption of fixed capital and other taxes less subsidies gives a proxy of the value of output, under the assumption that the net operating surplus of general government units is nil.

After estimating P11.1, P13.1 and P1.1 it is necessary to verify their consistency; some balancing or arbitration may be necessary; the point of departure should be, whenever available, national accounts data.

Box 10: Use of COFOG data

Germany notes (see reference below) that: "COFOG data are used for compiling the governmental part of specialist producers. The national accounts department transmitted to EPEA compilers:

- Data on market output of government sector for NACE divisions 37, 38 and 39,
- Government expenditure by function (COFOG) delivered to Eurostat,
- Extra evaluation of the non-market output of government sector for COFOG division 05.

For the government sector the distinction between market and non-market output is important. As no government unit is located in NACE division 39 we only examine divisions 37 and 38.

We compared output in the product groups 37 and 38 and other transactions like compensation of employees of government sector units located in NACE 37 and 38 with the corresponding transactions in the COFOG groups. We found out that data by COFOG groups do not correspond exactly with data by product group. Figures by COFOG groups 05.1 and 05.2 are higher than figures by product groups 37 and 38. This might be explained by the different compilation of transactions

according to COFOG and product groups. Compilation of transaction for government sector by product group is done using public finance statistics. Function F 432 ("sewerage") is the basis for NACE division 37 and function F 433 ("waste management") is the basis for NACE division 38. Furthermore, function F 434 ("street cleaning") that should be considered as environmental protection services are included among others in product group 81.29 ("other cleaning services") in NACE Rev. 2. However it is not possible to separate street cleaning from the other activities in this product group in the supply table. Luckily function F 434 is included in COFOG division 05. For government sector, we adjust our compilation in principle to data by COFOG because these data are aligned to environmental protection domains.

[...]

The non-market output is not directly available from surveys but it is calculated by the cost of production (sum of intermediate consumption, compensation of employees, taxes less subsidies on production and consumption of fixed capital). The government sector market output is filled in with data on market production in the product groups 37 and 38.

Data on intermediate consumption are recorded in the use table but only at the NACE divisions 37-39 aggregated level. Intermediate consumption in total and intermediate consumption of EP services was calculated using the ratios from the use table at basic prices. The same ratios were assumed for government and corporations sector."

Source: Federal Statistical Office of Germany 2015 Economy wide environmental protection expenditure accounts for Germany

P51G_NP.1: GFCF and acquisitions less disposals of non-produced non-financial assets

Whereas for P1.1, P11.1 P13.1 there is no directly available data (besides possibly EGSS), the data exists for P51G_NP.1, i.e. as the sum of COFOG variables P51G and NP. Note that acquisitions of non-produced non-financial assets may have in some countries values higher than P51G, in particular in the groups 05.3 "pollution abatement" and 05.4 "protection of biodiversity and landscape"; furthermore in some countries due to the disposals of non-produced non-financial assets it may happen that P51G_NP is negative for some years.

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P3_EPS.1: final consumption of environmental protection services

P3_EPS.1 is directly available from COFOG.

5.1.2. Table 1: voluntary part

The voluntary part of Table 1 asks to report some additional characteristics, mainly concerning the costs of production of EP services. It also asks for a full breakdown of mandatory and voluntary characteristics by individual CEPA classes, including a subdivision of CEPA 1 relating to climate change.

Table 1: General Government and NPISH - voluntary part	CEPA					
	CEPA 1	of which CEPA 1.1.2 and 1.2.2 (Climate change)	CEPA 2	...	CEPA 9	Total
(P51G_NP.1) Gross fixed capital formation *)	x	x	X	x	x	x
(P2.1) Intermediate consumption	x	x	x	x	x	x
(P2_EPS.1) Intermediate consumption of EP services	x	x	x	x	x	x
(P2_NEPS.1) Intermediate consumption (excluding EP services)	x	x	x	x	x	x
(D1.1) Compensation of employees	x	x	x	x	x	x
(P1_ANC.1) Ancillary EP output ((P2_NEPS) + (D1))	x	x	x	x	x	x
(D29-D39.1) Other taxes less subsidies on production	x	x	x	x	x	x
(P51C.1) Consumption of fixed capital	x	x	x	x	x	x
(B2N.1) Net operating surplus ((P1.1) + (RBP.1) - (P2.1) - (D1.1) - (P51C.1) - (D29-D39.1))	x	x	x	x	x	x
(P1.1) EP output ((P13.1) + (P11.1))	x	x	X	x	x	x
(P11.1) EP market output	x	x	X	x	x	x
(P13.1) EP non-market output (includes P.131 (payments for non-market	x	x	X	x	x	x
(RBP.1) Receipts from by-products	x	x	x	x	x	x
(EMP.1) Employment	x	x	x	x	x	x
(P3_EPS.1) Final consumption of EP services	x	x	X	x	x	x
(P2_EXT_EPS.1) Total Intermediate consumption of EP services	x	x	x	x	x	x

X	CEPA and characteristics already reported in the mandatory part
x	CEPA to be filled in voluntarily (mandatory characteristics)
.	Voluntary characteristics

*) and acquisitions less disposals of non-produced non-financial assets

The sections below explain how the voluntary part can be filled-in. First the calculation of cost components is addressed.

Estimation of costs for production of EP services by producers also engaged in non-EP production

The voluntary part of Table 1 requests the cost components for the production of EP services, e.g. intermediate consumption, compensation of employees, etc. Whenever a production unit is engaged in production of EP services as well as other non-EP production, exclusively the costs related to the production of EP services should be reported. It may happen that there is no statistical information to distinguish both types of costs.⁽⁵⁷⁾ Instead it will be easier to have access to data on the part of the EP output out of the total output than to which part of the costs are for production of EP services. For instance, if the unit is a secondary EP producer, possibly it will be known the total output, the secondary EP output and total production costs (intermediate consumption, etc.) but not the costs associated to the production of EP services. In those cases, the cost data available will not correspond to the production of EP services but to the total output of the unit and at the aggregated level to the total output of the industry.

Whenever the country has a lot of secondary EP production, or the producers engaged in EP as their principal activity have important secondary non-EP production, a method is necessary to estimate the costs associated to EP output. This handbook proposes a pro-rata method as explained next.

Table 36 gives an example: the total of costs in the data sources (750) correspond to total output (750) including the output corresponding to the EP services of the considered CEPA (500), output in other EP products (200) and related non-EP output (50). The costs to be recorded for the CEPA should be re-scaled to the sum of EP services and related non-EP output (550), using the proportions of the costs in the basic data.

⁽⁵⁷⁾ If there was perfect information to identify all the costs, probably statisticians would have created a separate local KAU for the EP activities (see ESA 2010, §§ 2.148 sq)

Table 36: Rescaling the costs to the production of EP services (example)

	basic data	proportion of the costs in the total costs	data to be filled in
EP services (considered CEPA)	500		500
market	200		200
non-market	300		300
Other EP output	200		-
Related non-EP output	50		50
Total output = total costs	750	100%	550
P2	300	40%	220
D1	200	27%	147
D29_39	50	7%	37
P51C	150	20%	110
B2	50	7%	37

Note that the 'rescaling' or 're-gauging' process should also be applied to P51G_NP: if data allow to do so, the part of the GFCF and acquisition less disposals of non-produced non-financial assets which is not for the production of EP services but e.g. for the production of a non-environmental output should be excluded on a pro-rata basis.

In practice, EPEA compilers must use their judgement to decide in which cases they apply this technique, e.g. in specific cases (CEPA codes, etc.) in which secondary activities are important and their omission from EPEA would be missed, also considering the costs-merits of each case.

5.1.2.1. DETAILED DATA FOR THE VOLUNTARY PART

The explanations that follow for each characteristic are applicable in principle to all the CEPA classes; however when applying a general method it is necessary to keep in mind that the data availability is very different for each CEPA class.

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P2.1, P2_EPS.1 and P2_NEPS.1: intermediate consumption

P2.1: total intermediate consumption for the production of EP services

Theoretically COFOG data classify expenditure in a given function based on individual transactions, i.e. transaction by transaction, as opposed to the alternative method of classifying statistical units to this function and then attributing all their expenditure to this function, i.e. unit by unit. It means that theoretically intermediate consumption of all general government units in e.g. EP services corresponding to CEPA 2 should be recorded under the position 05.02 in COFOG data.

In practice however COFOG data are often compiled on the basis of statistical units (departments, services) which are classified in a function. In this case, P2 under the position 05.02 in COFOG data will correspond to the intermediate consumption of all units classified under CEPA 2.

Because the results are practically and conceptually different, EPEA compilers should investigate whether COFOG compilers follow the first (transaction by transaction) or the second (unit by unit) approach.

If they follow the second approach it may be assumed that P2 recorded in COFOG division 05 data corresponds to the intermediate consumption for the production of EP services. If they follow the first approach P2 recorded in COFOG division 05 data corresponds to P2_EPS_EXT (see below).

In this case a method must be found to estimate P2.1. Starting from the value of output (mandatory characteristic P1.1) one can apply the ratio $[P2/P1]$ either from industry tables for NACE 37 and 38.1+38.2 or, if they do not exist, from SBS data. However this approach hides that the structure of costs may be very different for general government units and corporations.

In order to estimate intermediate consumption for the total environmental protection output P2.1 must then be re-scaled to the total output applying the ratio [intermediate consumption / output] derived from COFOG 05 data.

P2_EPS.1: intermediate consumption of environment protection services by general government units engaged in environmental protection activities

This characteristic mainly concerns CEPA 2 and 3, as for other CEPA intermediate consumption of EP services for the production of EP services may be assumed to be zero or insignificant. P2_EPS.1 is generally not directly available. Data can be estimated either on the basis of surveys, whenever they exist or using ratios from corporations (see below Table 2), under the assumption that the general government units engaged in environmental protection activities have the same costs structure as corporations units engaged in environmental protection activities in the same CEPA classes.

However, direct data are always preferable. Government units may purchase as intermediate consumption the services provided by corporations; they may also own the main part of fixed assets engaged in the production of EP services and support the main part of fixed capital consumption; therefore the structure of their production costs might be rather different than that of corporations. The description of the organisation of the production of EP services and its partition between general government and corporations is important for deciding whether or not the assumption made above is correct.

P2_NEPS.1: intermediate consumption (excluding environment protection services) of general government units engaged in environmental protection activities

This characteristic is equal to P2.1 less P2_EPS.1.

D1.1: compensation of employees

D1.1 is to be estimated on the basis of COFOG division 05 data. In order to estimate compensation of employees for the total environmental protection output D1.1 must then be proportioned to the total output applying the ratio [intermediate consumption / output] derived from COFOG 05 data.

P1_ANC.1: ancillary EP output (simplified valuation legally acceptable)

P1_ANC.1 is the sum of P2_NEPS.1 (intermediate consumption of non-EP services products) and D1.1 (compensation of employees).

D29-D39.1: other taxes less subsidies on production

COFOG data from the ESA2010 transmission programme reports together D29 + D5 + D8. It may be possible to obtain from COFOG compilers the value for D.29 separated. If there is no data for this characteristic a possible approach is to verify whether general government units have a situation similar to corporations (e.g. for market output) regarding other taxes and subsidies on production. This point can be checked in the legislation. If confirmed, EPEA compilers may approximate the value of this characteristic using the ratio [taxes less subsidies on production / output] established for the corporations market output – see below Table 2.

Some countries make the assumption that this characteristic is nil for general government units. However this is not always the case and must be verified.

P51C.1: consumption of fixed capital

This characteristic is the consumption of the stock of fixed capital by general government units engaged in EP services.

This characteristic is not available from COFOG data and cannot be collected through surveys. National accountants may have estimated the value of consumption of fixed capital at the level of the whole general government institutional sector, and in some cases for particular functions. However in most cases consumption of fixed capital of general government units engaged in EP services has to

be calculated. Several calculation methods are possible. It is better to apply the same method as national accounts.

Whenever the gross fixed capital of general government units for the production of EP services is known for a sufficient number of years, which is generally the case for COFOG data – most countries have series starting from 1995 or 2000 for the various environmental protection domains, the stock of fixed capital may be calculated using the “perpetual inventory method” and the consumption of fixed capital can be calculated afterwards.⁽⁵⁸⁾ EPEA compilers must approach national accountants in order to apply the same assumptions concerning the expected average economic life of assets and transition from current to constant prices. This work must be done by CEPA as they have very different structures of fixed capital stocks.

Whenever this is not possible, some countries apply the ratio [consumption of fixed capital/output] for the general government institutional sector. However this approach should not be used for CEPA 2 and 3. For these two CEPA it would be preferable to use the ratio [consumption of fixed capital/output] for NACE 37 and 38.1+38.2.

RNO.1: related non-EP output

Related non-EP output mainly concern CEPA 2, 3 and 4. There are several approaches to obtain their value.

One approach is using industrial production surveys: some countries collect output detailed by product for NACE 37-39. The value of the sales of waste from waste collection or energy from waste incineration, or sludge from waste water management is recorded besides the value of the waste water and waste management services, which give a first estimate of the value of by-products.

Another approach is a quantity x price method. Specific surveys on waste water treatment and waste collection and treatment units collect the quantities of sludge, waste and energy produced. These quantities are then multiplied by their prices. The advantage of this approach is that ancillary activities may be included in the estimates.

These data apply to all producing units in CEPA classes 2, 3 and 4 and not only to general government units. Whenever the total value of by-products is estimated, one may calculate the value corresponding to general government units using ratios [output of general government units/total output].

Note that amongst the eleven countries that reported general government related non-EP output (formerly called receipts from by-products) in the Joint Eurostat/OECD EPER questionnaire, the value reported was almost nil, except in two countries where they represented respectively 1% and 4% of total general government current expenditure.

B2N.1: net operating surplus

This characteristic is a balancing item. It is only available when complete production and generation of income accounts for the market producers of EP services of the general government sector are available, either on the basis of government finance statistics or from other sources like budget documents for some specific categories of units.

The value of net operating surplus may be approximated with the following formula:

$$P1.1 + RNO.1 - P2.1 - D1.1 - D29-D39.1 - P51C.1$$

This formula gives an approximation to the net operating surplus of the market producers of the general government whose output (P11.1) is recorded in Table 1.

Note that the calculation of net operating surplus as a balancing item (through the formula $P1.1 + RNO.1 - P2.1 - D1.1 - D29-D39.1 - P51C.1$) requires that all inputs are re-scaled to the sum of output in EP services and related non-EP output. Whenever the basic data on intermediate consumption and compensation of employees refer to a value of output different from the sum of output in EP services and related non-EP output recorded in the questionnaire as $P1.1 + RNO.1$, for

⁽⁵⁸⁾ See [OECD Manual Measuring Capital \(2009\)](#)

example because some secondary output is taken into account in the basic data, they should be re-scaled (see above section “estimation of costs for EP production (re-scaling the costs)”).

NEGB2N_GG.6: negative net operating surplus of market producers of general government sector

This characteristic is presented and explained in section 3.2.2. Although it is only requested in the voluntary part of Table 6 (transfers), it is closely related to the accounts of general government units. If a negative net operating surplus of market producers of the general government sector may be identified and valued, an implicit subsidy from the parent institutional unit is recorded to compensate it (implicit means that this flow is notional and not recorded in national accounts).

As indicated by Netherlands,⁽⁵⁹⁾ although in some cases this characteristic is important in size, it is not possible to derive it directly from national accounts. In theory, the main difficulty is that the characteristic cannot be obtained from the consolidated accounts of all market producers of the general government units in a given CEPA. Instead it should be calculated summing the data for only those market units that have a negative net operating surplus. Therefore it requires an examination unit per unit. Limited to EP services market producers in CEPA 2 and 3 the task is not out of reach for those countries that have public finance datasets based on registers.

A specific point is however the calculation of the consumption of fixed capital for each unit. It supposes a complex procedure unless it has become a routine calculation. As accounts of the unit generally record the stock of fixed assets, a possibility would be to derive consumption of fixed capital from the value of the stock.

Some estimates of the consolidated deficit of market producers of the general government sector may be available from public finances and budget analysis. Consolidated positive and negative net operating surplus could be a second best estimate of the characteristic.

EMP.1: employment

Employment may be obtained directly from Environmental Goods and Services Sector accounts (EGSS), provided some conditions are met as explained in section 4:

- EGSS must allow distinguishing environmental protection from resource managements, so that only the former are accounted for in EPEA
- EGSS must be calculated at CEPA class level or at least allowing a mapping to the CEPA groupings used in EPEA
- EGSS employment by industry must be mapped to institutional sector.

Otherwise a specific estimation of employment is necessary. This can be done as explained here.

In the case of general government there is no self-employed labour. The characteristic EMP can be calculated applying to compensation of employees (D1.1) the ratio [total employment/compensation of employees] as available from SBS or national accounts. This should be done separately for NACE 37, 38.1+38.2 (for CEPA 2 and 3) and for NACE O or O-Q.

Another approach is using the results of surveys collecting employment. Care should be taken to calculate the ratio using total employment in full time equivalent data. If using SBS data, the ratio may be calculated directly in full time equivalents. In the ESA 2010 transmission programme Table 3 (tables by industry) employment data are reported in thousands of persons, thousands of hours worked and thousands of jobs. None of these measures correspond to employment in full time equivalents. Ideally the number of full time equivalents should be calculated dividing the number of hours worked by the average number of hours worked in full-time jobs in each industry/institutional sector. The Labour Force Survey collects all the information needed (see 4.3.6)

⁽⁵⁹⁾ Statistics Netherlands (2012) Environmental protection expenditure accounts for the Netherlands

Table 37: Calculation of employment in full time equivalents: example of Denmark NACE O

	2008	2009	2010	2011	2012	2013	2014
A. Share of part time workers	15.5%	16.4%	14.8%	15.0%	14.1%	13.0%	12.5%
Hours worked per week							
B. By part-time workers	23.3	23.3	24.6	23	23.1	23.3	21.6
C. By full-time workers	38.3	38.5	38.4	39.1	38.9	38.2	38.7
D = B/C	61%	61%	64%	59%	59%	61%	56%
Ratio FTE/total employment = 1+ (D-1)*A	93.9%	93.5%	94.7%	93.8%	94.3%	94.9%	94.5%

Source: Eurostat (online data codes: lfsa_epgan2 and lfsa_ewhan2); last update: 26.01.16, extracted: 28.01.16

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P2_EPS_EXT.1: total intermediate consumption of environmental protection services by general government units.

This characteristic is the intermediate consumption of environment protection services of all general government units either engaged in environmental protection activities or not (e.g. general public administration activities, education, health, etc.). The characteristic should be calculated for the EP services corresponding to the different CEPA classes. However it will generally be limited to EP services in CEPA 2 and 3.

As regards the EP services of other CEPA classes, a credible assumption is that the intermediate consumption of EP services by general government units would be negligible: either these EP services are mainly ancillary (CEPA 1) or non-market (CEPA 6, 9) and would not be used as intermediate consumption of general government units or they are market (CEPA 5, 8) but would most probably be used as GFCF.

As concerns EP services in CEPA 2 and 3, the first step is to determine which of the two approaches indicated in the discussion of P2_EPS is used by COFOG compilers. If they follow the first approach (individual transactions) P2 in COFOG will correspond to P2_EPS_EXT.1. If they follow the second approach (unit by unit) P2 in COFOG will correspond to P2.1 and one has to find a way to estimate P2_EPS_EXT.1.

This can be done applying to the total output of the general government sector (from national accounts) a ratio [intermediate consumption in CPA 37 and 38 products / output] calculated on the basis of the use table for the NACEs that mainly produce non-market output (e.g. NACE P and Q; NACE O should not be considered when there are indications that some units of the general government engaged in the production of EP services are classified in this NACE). This will provide an estimate of the intermediate consumption of EP services by the general government units engaged in production of non-environmental protection output. To this estimate should be added the intermediate consumption of EP services by the general government units engaged in production of environmental protection output of CEPA 2 and 3. Once again the ratios P2/P1 can be applied (see P2_EPS.1).

5.1.2.2. DISTRIBUTION BY INDIVIDUAL CEPA CLASSES

Whenever COFOG data are used to distribute the characteristics by CEPA classes, one should keep in mind that CEPA 2, CEPA 3, CEPA 6, and the groupings of CEPA 1+4+5+7, and CEPA 8+9 are already available from the mandatory part of the questionnaire. Therefore the disaggregation by individual CEPA classes only concerns first the sum of CEPA 1+4+5+7 and then the sum of CEPA 8+9. COFOG data already distinguish CEPA 8 (group 05.5) and 9 (group 05.6).

For the purpose of compiling EPEA some countries use a code in the public finance accounts database in order to distinguish environmental related expenditure from other expenditure in such a way as to allow dividing by CEPA classes.

For some institutions, e.g. the universities, whose primary activity is not related to environmental protection, it may be necessary to estimate that part of their activities which is related to environmental protection. This can be done from detailed government accounts information about the activities and in some cases using assumptions.⁽⁶⁰⁾

Another approach is using surveys on environmental protection expenditure.

In the absence of specific surveys or coding of public expenditure at a more detailed level than COFOG groups, this disaggregation is problematic and no general method may be proposed except the detailed analysis of the accounts of the main general government departments engaged in environmental protection.

If data are only available for the CEPA 1+4+5+7 aggregate, and a split is not possible, aggregates of CEPA classes may be recorded under only one of the CEPA classes concerned following a dominance principle. In this case the aggregate should be properly flagged.

5.2. Table 2: corporations as market producers of environmental protection services

Organising the data for the corporation sector table

The compilation work should start with the two tables presented in the introduction of Chapter 5: “Table presenting the supply of EP services” and “Table presenting the production and generation of income account of EP services”, for the corporations sector. These tables must be established for CPA 37, 38.1+38.2 and 39 products and the corresponding producers.

The first table identifies all EP services produced by corporations and distinguishes specialist producers (i.e., those producers which have the production of EP services as their principal activity) and non-specialist producers (i.e., those which produce EP services as secondary output, e.g. producers classified in NACE 36). The second table summarises the elements of the production and generation of income accounts for the specialist producers. It may be compiled either based on SBS or national accounts tables by industry.

These two tables should be complemented by two datasets:

- Data related to the production of EP services by corporations corresponding to other CEPA classes, e.g. noise insulation works, nuclear waste collection and treatment, environmental protection R&D, environmental management services, etc.;
- Data related to the other characteristic EP activities of CEPA 2 and 3 (e.g. street sweeping, consultancy in the domain of waste water and waste ...).

These two complementary datasets may be constructed from specific environmental protection surveys. Whenever these surveys do not exist a solution would be starting from an estimate of the output value and applying the costs structure of the corresponding NACE at the most detailed level.

⁽⁶⁰⁾ See Statistics Denmark (2012) Danish Environmental Expenditure Accounts 2008

Table 38: Organisation of the data for EPEA Table 2

	Corporations, producers of CPA 37, 38.1+38.2, 39		Other characteristic activities of CEPA 2 and 3	Other characteristic activities, other CEPA	Total
	Specialist	Non specialist			
Market output of EP services	X	X	X	X	X
Other output					
Intermediate consumption	X	X	X	X	X
Compensation of employees	X	X	X	X	X
Other taxes less subsidies on production	X	X	X	X	X
Consumption of fixed capital	X	X	X	X	X
Net operating surplus	X	X	X	X	X

5.2.1. Table 2: mandatory part

Table2: Corporations: EPS market producers	CEPA		
	CEPA 2	CEPA 3	CEPA 4
(P11.2) EP market output	X	X	X
(P2_EPS_SP.2) intermediate consumption of EPS by corporations as specialist producers of EPS	X	X	X
(P51G_NP.2) Gross fixed capital formation *)	X	X	X

X To be filled in

*) and acquisitions less disposals of non-produced non-financial assets

P11.2: market output

This characteristic will normally be available for the most important products (CPA division 37 for CEPA 2, CPA division 38 for CEPA 3 and CPA division 39 for CEPA 4), although it will depend on the level of disaggregation of national accounts data. In some cases output for the corresponding CPA products (37, 38.1 + 38.2 and 39) is directly available from the supply table. When starting from industry data the output already recorded in Table 1 as general government output must be deducted. Whenever the data from national accounts are not sufficiently detailed, shares based on SBS data may be used to split the CPA 37-39 output.

P2_EPS_SP.2: intermediate consumption of environmental protection services by specialist producers of environmental protection services

Obviously the best approach is to use the results of surveys on environmental protection expenditure, whenever these surveys also cover specialist producers and ask questions on their intermediate consumption of EP services.

Whenever no survey exists, compilers should try to estimate this characteristic starting from the use tables, using a ratio [intermediate consumption of NACE 37, 38.1, 38.2, 39 products by NACE 37, 38.1+38.2 and 39 / total 37, 38.1, 38.2, 39 output], and applying it to P11.2 under the assumption that intermediate consumption of other EP market services is nil or negligible. In this case the main difficulty is separating NACE 38.3 out of 38 (and CPA 38.3 out of 38) whenever data are not detailed enough.

P51G_NP.2: GFCF and acquisitions less disposals of non-produced non-financial assets

The situation is similar as for P11.2. However industry tables only provide information on GFCF, i.e. acquisition less disposals of (produced) fixed assets. GFCF of general government units recorded in Table 1 are to be deducted.

These data may be complemented by gross investment in land and gross investment in concessions, patents, licenses, trademarks and similar rights covered by the SBS characteristics 15 12 0 and 15

42 0. However there is no direct information on disposals of non-produced non-financial assets. Unless other sources of data exist, like surveys, a simplifying assumption is that acquisitions less disposals of non-produced non-financial assets are negligible.

5.2.2. Table 2: voluntary part

The voluntary part of Table 2 proposes to report more detailed characteristics, similar to those in the voluntary part of Table 1. It extends the coverage to all CEPA classes, which are to be reported individually, including an “of-which” position for the part of CEPA 1 relating to climate change.

Table 2: Corporations as market producers of EP services - voluntary part	CEPA					
	CEPA 1	of which CEPA 1.1.2 and 1.2.2 (Climate change)	CEPA 2	...	CEPA 9	Total
(P51G_NP.2) Gross fixed capital formation *)	x	x	X	x	x	x
(P2.2) Intermediate consumption	x	x	x	x	x	x
(P2_EPS.2) Intermediate consumption of EP services	x	x	x	x	x	x
(P2_EPS_SP.2) intermediate consumption of EPS by specialist producers	x	x	X	x	x	x
(P2_NEPS.2) Intermediate consumption (excluding EP services)	x	x	x	x	x	x
(D1.2) Compensation of employees	x	x	x	x	x	x
(P1_ANC.2) Ancillary EP output ((P2_NEPS.2) + (D1.2))	x	x	x	x	x	x
(D29-D39.2) Other taxes less subsidies on production	x	x	x	x	x	x
(P51C.2) Consumption of fixed capital	x	x	x	x	x	x
(B2N.2) Net operating surplus ((P11.2) + (RBP.2) - (P2.2) - (D1.2) - (P51C.2) - (D29-D39.2))	x	x	x	x	x	x
(P11.2) EP market output ((P11_MA.2) + (P11_SA.2))	x	x	X	x	x	x
(P11_MA.2) EP market output from main activities (specialist producers)	x	x	x	x	x	x
(P11_SA.2) EP market output from secondary producers (non-specialist producers)	x	x	x	x	x	x
(RNO.2) Related non-EP output	x	x	x	x	x	x
(EMP.2) Employment	x	x	x	x	x	x
(P2_EXT_EPS.2) Intermediate consumption of EPS (for production of EPS and for other production)	x	x	x	x	x	x

X	CEPA and characteristics already reported in the mandatory part
x	CEPA to be filled in voluntarily (mandatory characteristics)
.	Voluntary characteristics

*) and acquisitions less disposals of non-produced non-financial assets

5.2.2.1. DETAILED DATA FOR THE VOLUNTARY PART

PRODUCTION OF ENVIRONMENTAL PROTECTION SERVICES

P2.2, P2_EPS.2 and P2_NEPS.2: intermediate consumption

P2.2: total intermediate consumption of corporation units engaged in the production of market EP services

For the main activities in CEPA 2, 3 and 4 this characteristic may be calculated using a ratio [intermediate consumption / output] by industry available from national accounts data and applied to the mandatory characteristic P11.2 (market EP output of corporations).

Other EP activities are generally only a small part of NACE classes; one may use the ratio intermediate consumption / production based on SBS for these classes and apply it to output, under the assumption that EP activities have the same structure of costs that the whole class.

Specific surveys on environmental protection expenditure may also provide the necessary data.

P2_EPS.2: intermediate consumption of environment protection services by units of the corporation sector engaged in the production of market environmental protection services

P2_EPS.2 would be identical to the mandatory P2_EPS_SP if there were no secondary EP producers in Table 2. If there are data for secondary producers, P2_EPS.2 will be higher.

This characteristic mainly concerns CEPA 2 and 3. It may be calculated using a ratio from the use table [intermediate consumption of CPA products 37, 38.1+38.2 and 39 by NACE 37, 38.1+38.2 and 39 / total intermediate consumption of NACE 37, 38.1+38.2 and 39] applied to P2.2. The method 'estimation of costs for production of EP services by producers also engaged

in non-EP production' explained in section 5.1.2 may be used here too.

For other activities only the surveys on EP expenditure may provide the necessary data. Whenever such a survey does not exist a simplifying assumption is that P2_EPS.2 is nil for CEPA classes other than 2 and 3.

P2_NEPS.2: intermediate consumption (excluding environment protection services) by corporations units engaged in the production of market EP services

This characteristic calculated as P2.2 less P2_EPS.2.

D1.2: compensation of employees

The approach is the same as for P2.2: for those EP activities identified by their NACE code, D1.2 may be calculated using a ratio [compensation of employees / output] by industry available from national accounts data (ESA 2010 TP Table 3) or SBS data, applied to output (P11.2).

For other EP activities only specific surveys on environmental protection expenditure may provide the necessary data.

P1_ANC.2: ancillary EP output (simplified valuation legally acceptable)

P1_ANC.2 is the sum of P2_NEPS.2 and D1.2.

D29-D39.2: other taxes less subsidies on production

The approach is the same as for P2.2 and D1.2, except that there are no SBS data for this characteristic: for those EP activities identified by their NACE code this characteristic may be calculated using a ratio [other taxes less subsidies on production / output] by industry available from national accounts data (ESA 2010 TP Table 3), applied to market EP output (P11.2).

P51C.2: consumption of fixed capital

The approach is the same as for D29-D39.2: for those EP activities identified by their NACE code this characteristic may be calculated using a ratio [consumption of fixed capital / output] by industry available from national accounts data (ESA 2010 TP Table 3 of) applied to market EP output (P11.2).

For other activities a specific calculation may be necessary based on the method used in national accounts to calculate the consumption of fixed capital based on the stock of fixed capital, eventually calculated from the series of P51G.2 (gross fixed capital formation) for the corresponding CEPA.⁽⁶¹⁾

B2N.2: net operating surplus

This characteristic is calculated as $P1.2 + RNO.2 - P2.2 - D1.2 - D29-D39.2 - P51C.2$

Note that the integration of RNO.2 in the formula requires that all inputs are proportioned to the sum of output in EP services (P1.2) plus related non-EP output (RNO.2).

P11.MA.2 and P11.SA.2: main and secondary output of market environmental protection services by corporations.

These two characteristics break down the mandatory characteristic P11.2 (market output of corporations) in principal and secondary output. For CEPA classes 2, 3 and 4 (CPA 37, 38.1+38.2 and 39) the breakdown between principal (local KAUs classified in NACEs 37, 38.1+38.2 and 39) and secondary output (local KAUs classified in other NACE) is available from the supply table, when sufficiently detailed, and the distinction can be based on this information after deducting output produced by general government units, in particular those classified in NACE O.

For other CEPA classes the split may only be done on the basis of specific surveys on environmental protection expenditure.

RNO.2: related non-EP output

See RNO.1.

⁽⁶¹⁾ There is no consumption of fixed capital for non-produced assets included in P51G_NP

EMP.2: employment

See EMP.1. In the case of corporation sector, self-employed labour also exists. Therefore the ratio [employment in FTE/output] has to be preferred and applied to P11.2.

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P2_EPS_EXT.2: intermediate consumption of environmental protection services by corporations as market producers of environmental protection services, for the production of environmental protection services and for other production

This characteristic corresponds to the intermediate consumption of specialist and secondary producers for the production of EP services and for other production. For secondary producers it must thus include the intermediate consumption of EP services corresponding to their principal non-EP services output.

When it appears too difficult, for all secondary producers of EP services, to separate this intermediate consumption from the intermediate consumption of EP services of the units classified in “corporations other” reported in Table 3, countries may choose not to report this characteristic in Table 2 but to report all P2_EPS_EXT for corporations in Table 3, under P2_EPS_EXT.3. Such a choice must be clearly indicated.

In that case P2_EPS_EXT.3 in Table 3 will correspond to the intermediate consumption of EP services of all units of the corporations sector.

5.2.2.2. DATA BY INDIVIDUAL CEPA CLASSES

Data referring to CEPA 2, 3 and 4 may be filled in starting from national accounts or SBS surveys data.

P11.2 (and derived data) and P51G_NP.2 for other CEPA classes may only be filled-in when data related to the characteristic EP activities of these CEPA (e.g. noise insulation works, nuclear waste collection and treatment, environmental protection R&D by enterprises, environmental protection management or consultancy services provided by corporations...) have been collected through specific environmental protection surveys or data collection on specific categories of units.

5.3. Tables 3, 3a, 3b, 3b_add, 3c, 3d & 3e: corporations: other

These tables record the transactions of corporations as producers of ancillary output of EP services. They also record (in the voluntary part) the total intermediate consumption of EP services by corporations which are not producers of market EP services.

Table 3 covers corporations as ancillary EP producers, in all NACE categories. The sub-tables have the following NACE coverage: Table 3a covers NACE B, Table 3b covers NACE C, Table 3c covers NACE D, Table 3d covers NACE 36 (water supply) and Table 3e covers all other NACE. Table 3b_add further disaggregates Table 3c according to specific groupings of divisions of the section C.

The main data sources are the environmental characteristics of the SBS regulation (see chapter 4).

SBS environmental characteristics distinguish ancillary expenditure on CEPA 1, CEPA 2, CEPA 3 and “other environmental protection activities” (CEPA 4 to 9) and the total over all CEPAs. These characteristics are reported for NACE Rev.2 sections B-E (except for NACE Rev.2 divisions 37, 38 and 39) with a breakdown at two digits level (divisions). It means that data are available for the tables 3 and 3a to 3d, including the Table 3b_add (by division).

However whereas the investment data are directly available, the ancillary EP output is not. As stated

in chapter 4, the SBS Regulation only collects the total current expenditure: the SBS characteristic 21 14 0 corresponds to total current expenditure, i.e. the sum of internal current expenditure (intermediate consumption excluding intermediate consumption of EP services plus compensation of employees) and purchases of external EP services. The characteristic 21 14 0 is only asked every three years.

5.3.1. Table 3: mandatory part

Table 3: Corporations: other (also covering producers of ancillary EPS)	CEPA			
	CEPA 1	CEPA 2	CEPA 3	Sum of CEPA 4+5+6+7+8+9
(P1_ANC.3) Ancillary EP output, legally acceptable valuation	X	X	X	X
(P51G_NP.3) Gross fixed capital formation *)	X	X	X	X
	X	To be filled in		

*) and acquisitions less disposals of non-produced non-financial assets

All transactions in the mandatory part relate to the production of ancillary EP services.

P1_ANC.3: ancillary EP output

In EPEA ancillary output is valued in principle as the sum of costs, according to SEEA-CF. However the mandatory part of Table 3 accepts the simplified valuation of ancillary EP output. It is the same as the (voluntary) characteristic ancillary EP output in Tables 1 and 2.

P1_ANC.3 may be obtained from the environmental characteristic (21 14 0). However, as indicated above, this characteristic covers total expenditure on environmental protection, including not only internal expenditure but also the purchases of EP services. Instead P1_ANC.3 only covers internal expenditure. Therefore it is necessary to deduct the purchases of EP services from characteristic 21 14 0 to obtain P1_ANC.3. These purchases may be available from the national accounts use table (as the intermediate consumption of product CPA 37, etc. by industries) provided it is sufficiently disaggregated. However normally it will not be sufficiently detailed for section C.

When subtracting the intermediate consumption of product CPA 37, etc., care should be taken that data come from two different sources (SBS and national accounts), and that their scope may be different. In particular it will be necessary to gross up the SBS results for each NACE to the total of the corresponding NACE in national accounts, e.g., comparing the characteristic production in SBS with the output in national accounts.

In some cases (e.g. France and Germany) the national surveys collecting the SBS data distinguish the purchases of environmental protection services from internal expenditure. In those cases the results of the surveys, after grossing-up and corrections, may be directly used for filling in the P1_ANC.3 characteristic.

SBS data on current expenditure are only requested on a 3 yearly basis. It is thus necessary to interpolate data between survey years and extrapolate from the last survey's year when no end point is available. Linear interpolation may be used in the first case. In the second case, it is possible to calculate the ratio [current internal expenditure/total production] for the previous years and apply it to the production of the missing year.

P51G_NP.3: gross fixed capital formation and acquisition less disposals of non-produced non-financial assets

This characteristic is normally obtained as the sum of SBS characteristics (21 11 0) and (21 12 0) (see section 4.2.2). Data are available for CEPA 1, 2, 3 and sum of CEPA 4+5+6+7+8+9, which corresponds to the CEPA groupings requested in the mandatory part of the questionnaire. Data are available by NACE classes of the section B to E (except divisions E37, 38 and 39). There may be a need to gross up the SBS data to the national accounts data. This can be done comparing output by NACE from SBS and national accounts.

Table 39: Example of calculation of P51G for CEPA 1 (fictitious data)

	SBS data	SBS output	NA output	Grossing factor	EPEA value
NACE B	32	1 250	1 370	1,10	35,1
NACE C	450	30 200	45 120	1,49	672,3
Divisions 10-12	56	80	120	1,50	84,0
Divisions 13-15	12	700	850	1,21	14,6
...					
Division 33	65	3 200	3 500	1,09	71,1
NACE D35	260	6 700	8 000	1,19	310,4
NACE E36	150	2 300	2 700	1,17	176,1

Box 11: Gross fixed capital formation for the production of ancillary activities

Norway notes (see reference below) some limitations in both the current SBS statistics and the EPEA report tables: all environmental expenditure come from industrial installations that are in the production phase, and for offshore installations also in the shutdown/dismantling stage of their life cycle. In most cases, large investments are made when a production facility is built and made ready for production. This means that any environmental investment in the project development phase, the construction phase, as well as possible plant dismantling in NACE 05, 07- 36, will not be included in the statistics. This is possibly why large investments in protection of biological diversity and landscape are consistently absent from the statistics. Examples of such investments from the energy sector may be: the postponement of offshore seismic surveys in the cod spawn season in the Norwegian Sea, the construction of channels for salmon migration bypassing hydro power installations, extra costs in choosing power line trajectories, etc.

Source: Statistics Norway (2013) Environmental Protection Expenditure Accounts Evaluation of requirements for the proposed module on EPEA amending Regulation No 691/2011 on European environmental economic accounts

5.3.2. Table 3: voluntary part

The voluntary part of the questionnaire requests two sets of complementary characteristics: the detailed costs of production for ancillary output, including an alternative valuation of this ancillary output and a disaggregation of mandatory data with a full CEPA breakdown.

5.3.2.1. DETAILED DATA FOR THE VOLUNTARY PART

Table 3: Corporations: other (also covering producers of ancillary EPS) - voluntary part	CEPA					
	CEPA 1	of which CEPA 1.1.2 and 1.2.2 (Climate change)	CEPA 2	...	CEPA 9	Total
(P51G_NP.3) Gross fixed capital formation *)	x	x	x	x	x	x
(INV_EOP.3) GFCF specific EP fixed assets	x	x	x	x	x	x
(INV_IT.3) GFCF cleaner EP fixed assets	x	x	x	x	x	x
(P2.3) Intermediate consumption	x	x	x	x	x	x
(P2_EPS.3) Intermediate consumption of EP services	x	x	x	x	x	x
(P2_NEPS.3) Intermediate consumption (excluding EP services)	x	x	x	x	x	x
(D1.3) Compensation of employees	x	x	x	x	x	x
(P1_ANC.3) EP ancillary output (legally acceptable valuation) ((P2_NEPS.3) + (D1.3))	x	x	x	x	x	x
(D29-D39.3) Other taxes less subsidies on production	x	x	x	x	x	x
(P51C.3) Consumption of fixed capital	x	x	x	x	x	x
(P1_ANC_ESA.3) (ESA-compatible output) ((P2_NEPS.3) + (D1.3) + (P51C.3) + (D29-D39.3))	x	x	x	x	x	x
(RNO.3) Related non-EP output	x	x	x	x	x	x
(EMP.3) Employment	x	x	x	x	x	x
(P2_EXT_EPS.3) Total Intermediate consumption of EP services	x	x	x	x	x	x

x	CEPA and characteristics already reported in the mandatory part
x	CEPA to be filled in voluntarily (mandatory characteristics)
x	Voluntary characteristics

*) and acquisitions less disposals of non-produced non-financial assets

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INV_EOP.3: GFCF on specific EP fixed assets (end-of-pipe technologies) and INV_IT.3: GFCF on cleaner EP fixed assets (integrated technologies)

These characteristics are the two SBS environmental characteristics (21 11 0) and (21 12 0) (see P51G_NP.3 above).

P2.3: intermediate consumption

This characteristic is the intermediate consumption for the production of ancillary output.

Only those countries collecting detailed cost of ancillary EP output from their surveys may be able to fill-in this characteristic directly.

Other countries could use the ratio [intermediate consumption/sum of intermediate consumption and compensation of employees] established for market producers in Table 2 and apply it to P1_ANC.3, as estimated above (see section 5.3.1).

P2_EPS.3: intermediate consumption of environmental protection services

This characteristic is the intermediate consumption of EP services for the production of ancillary EP services. In many cases surveys cannot distinguish this intermediate consumption from the intermediate consumption of the unit for its principal or secondary activity. Although this characteristic is not always nil (e.g. when for waste water ancillary treatment sludge is produced that must be eliminated externally) it should be put to zero if this intermediate consumption is accounted for in the intermediate consumption corresponding to the principal or secondary activity, which is generally the case in surveys. In this case P2 equals P2_NEPS and must be calculated by the ratio [intermediate consumption excluding EP services/sum of intermediate consumption (excluding EP services) and compensation of employees] based on the data for market producers in Table 2.

P2_NEPS.3: intermediate consumption (excluding environmental protection services)

The questionnaire requests to report separately the intermediate consumption of EP services and intermediate consumption excluding EP services. This may prove difficult as surveys generally do not distinguish these two categories of intermediate consumption. A simplifying convention is not to record P2_EPS.3, assuming that all intermediate consumption of EP services is recorded as intermediate consumption for the main activity of the unit. This is in line with the valuation of ancillary output (see above P1_ANC).

Box 12: Intermediate consumption of environmental protection services for the production of ancillary activities

Germany notes (see reference below) that “In the EPE survey, it is asked for the variable expenditure on external services and other expenditure, in particular on measures carried out by the enterprise itself. This variable is listed twice, for plant-related expenditure and for expenditure not on the running of plant. Because we have no information how to split the external services from the expenditure carried out by the enterprise itself, we record the whole amount as external services. This implies an underestimation of the intermediate consumption of non-specialized producers with ancillary output (by the fraction of intermediate consumption of environmental protection services used for the production of ancillary environmental protection services).”

Source: Federal Statistical Office of Germany (2015) Economy wide environmental protection expenditure accounts for Germany

D1.3: compensation of employees

Only those countries which collect detailed cost of ancillary EP output in their national surveys may be able to fill-in this characteristic directly.

Other countries could use the ratio [compensation of employees / sum of intermediate consumption, excluding intermediate consumption of EP services and compensation of employees] based on data for specialist for market producers in Table 2 and apply it to P1_ANC.3. Alternatively, they could use ratios [compensation of employees / sum of intermediate consumption plus compensation of employees] by industry from national accounts.

D29-D39.3: other taxes less subsidies on production

This item is rarely directly available even if national surveys are very detailed.

A simplifying convention is not to report other taxes on production, except for these taxes whose base is the compensation of employees and to separately identify subsidies linked with the exercise of the ancillary activity: e.g. subsidies for the internal treatment of waste water or waste.

Box 13: Other taxes less subsidies on production

Sweden notes (see reference below) that EPEA tables require that other taxes on production and other subsidies on production are calculated in order to correctly obtain net operating surplus. To calculate the share of environmental protection of taxes and subsidies an estimation based on the total of the sectors was conducted. The basic principle was to approximate the environmental protection share in total production (the production value). However, the national accounts data were only used for sectors specifically identifiable, i.e. specialist producers.

Source: Statistics Sweden (2014): Meeting new data requirements – An evaluation of Environmental Protection Expenditure Accounts in Sweden and its implementation

P51C.3: consumption of fixed capital

This characteristic cannot be collected through surveys. In most cases it has to be calculated. There are several calculation methods. The most accurate one is the permanent inventory method which is the preferred method in national accounts.

Whenever the gross fixed capital for the production of environmental protection ancillary services is known for a sufficient number of years, which is generally the case through EPER data – most countries have series starting from 1995 or 2000 for the various environmental protection domains-, the stock of fixed capital may be calculated with the perpetual inventory method and the consumption of fixed capital can be calculated afterwards (see section 5.1.2). EPEA compilers must approach

national accountants in order to apply the same assumptions as concerns the expected average economic life of assets and transition from current to constant prices. This work must be done by CEPA as they have very different structures of fixed capital stocks.

Whenever this is not the possible, countries may apply the ratio [consumption of fixed capital/intermediate consumption + compensation of employees] for the market producers of CEPA 2 and 3. However this method does not allow estimating the consumption of fixed capital for the other CEPA classes.

Box 14: Consumption of fixed capital for the production of ancillary services

Denmark notes (see reference below) that the survey of the environmental protection expenditures did not include any information on the consumption of fixed capital, but since it seems important to include also this component when the output of environmental protection services is estimated from the cost side, estimates by CEPA groups and industries have been produced for the purpose of this report. The estimate has been done by using the information on gross fixed capital formation and the share between consumption of fixed capital and gross capital formation for all industries within NACE section C. Thus all the numbers for Gross fixed capital formation (GFCF) has been multiplied by 1.159, which was the proportion between consumption of fixed capital and GFCF in 2008. This estimation procedure is of course very rough, and care should be taken not to use these numbers for detailed analysis or for drawing specific conclusions about the consumption of fixed capital.

Source: Statistics Denmark (2012) Danish environmental protection expenditure accounts 2008

Sweden notes that consumption of fixed capital for environmental investments had to be calculated for ancillary activities. "The total environmental protection investments from the EPE industry survey have been used as basic background data and the national accounts ratios have been applied per NACE. The national accounts apply the perpetual inventory model (PIM) to derive appropriate ratios. The depreciation rate was made on type "non-specified machines" with an expected life time of 10-25 year depending on industry. An average was calculated by 2-digit NACE and applied to the EP investments".

Source: Statistics Sweden (2014): Meeting new data requirements – An evaluation of Environmental Protection Expenditure Accounts in Sweden and its implementation

P1_ANC_ESA.3: ancillary EP output (ESA compatible valuation)

The ESA compatible valuation of ancillary EP output is obtained summing up the costs components: intermediate consumption, compensation of employees, other taxes less subsidies on production, consumption of fixed capital.

Depending on how the costs components of ancillary output are obtained, those costs components may also include costs partially covered by the related non-EP output (RNO.3 see below) In that case the value of ancillary EP output is the sum of intermediate consumption, compensation of employees, other taxes less subsidies on production, consumption of fixed capital less RNO.3.

Box 15: Environmental protection ancillary output, ESA compatible valuation

The German survey asks to report a detailed decomposition of current expenditure: compensation of employees, expenditure for operating supplies, for energy, expenditure for external services, fees, depreciation and imputed interest. This allows filling-in all characteristics asked in the voluntary part.

- Expenditures for operating supplies and energy → P2_NPS.3
- Compensation of employees → D1.3
- Depreciation as consumption of fixed capital → P51C.3

Finally, ESA compatible valuation of ancillary output is calculated by summing up the cost of production.

Source: Federal Statistical Office of Germany (2015) Economy wide environmental protection expenditure accounts for Germany

RNO.3: related non-EP output

Only specific surveys may provide data on related non-EP output by ancillary EP producers. Related non-EP output may offset an important part and even exceed the value of P1_ANC.3

For six of the 13 countries that reported related non-EP output for ancillary activities in the framework of the Joint Eurostat/OECD EPER questionnaire the value of these receipts was relatively important when compared to internal current expenditure for ancillary activities, amounting to more than 60% of total current expenditure and even exceeding 100%.

Data by CEPA indicate that this is mainly focused on CEPA 3 although CEPA 1, CEPA 4 and CEPA 7 may also have important related non-EP output.

EMP.3: employment (full time equivalents)

Employment may be obtained directly from Environmental Goods and Services Sector accounts (EGSS), provided some conditions are met as explained in section 4

In other cases, whenever not collected in national surveys on environmental protection expenditure, this characteristic may be calculated on the basis of compensation of employees (D1.3) using ratios [EMP/Compensation of employees] at NACE level.

USES OF ENVIRONMENTAL PROTECTION SERVICES

P2_EXT_EPS.3: total intermediate consumption of environmental protection services

This characteristic is the total intermediate consumption of EP services by corporations other than producers of market EP services for production of EP services and for other production. It has to be calculated by CEPA class and corresponds to the intermediate consumption of EP services in products of this CEPA class.

For the industries covered in the SBS regulation on environmental characteristics, it can be calculated deducting ancillary EP output (P1_ANC.3) from the SBS characteristic (21 14 0) total current expenditure.

5.3.2.2. DATA BY INDIVIDUAL CEPA CLASSES

The break down by individual CEPA class, above CEPA classes 1, 2 and 3 which are mandatory under SBS regulation fully depends on the availability of data more detailed than SBS requirements, which is the case in most countries which conduct specific surveys on environmental protection expenditure.

5.4. Table 4: total supply

Table 4 summarises the EP output from tables 1, 2 and 3, adding some new characteristics needed to calculate the supply of EP services at purchaser's prices.

The characteristics are the same in the mandatory part and the voluntary part, the only difference being the level of CEPA breakdown.

5.4.1. Table 4: mandatory part

Total supply	CEPA		
	CEPA 2	CEPA 3	Sum of CEPA 1+4+5+6+7+8+9
(P1.4) EP output (P11.4 + P13.4 + P1_ANC.4)			
(P11.4) EP market output (= P11.1 + P11.2)			
(P1_ANC.4) Ancillary EP output, legally acceptable valuation (= P1_ANC.3)			
(P13.4) EP non-market output (=P13.1)			
(P2_EPS_SP.4) Intermediate consumption of EPS by specialist producers *)			
(P7.4) Imports of EP services	X	X	X
(P6.4) Exports of EP services	X	X	X
(D21-D31.4) VAT and other taxes less subsidies on EP services	X	X	X

	Automatically calculated
X	To be filled in

*) Intermediate consumption of EP services by corporations' and general government specialist producers of EP services

P11.4 EP: market output

This is calculated automatically. For the sum of CEPAs 1, 4, 5, 6, 7, 8 and 9 this characteristic is calculated as the sum of the characteristic P11.1 (mandatory part of table 1) and of characteristic P11.2 (voluntary part of table 2) for the respective CEPAs.

P2_EPS_SP.4: intermediate consumption of environmental protection services by specialist producers

This is calculated automatically. This is the sum of "intermediate consumption of EP services by corporations as specialist producer" (characteristic P2_EPS_SP.2 reported in the mandatory part of Table 2) and of "intermediate consumption of EP services by producers of the general government sector" (characteristic P2_EPS.1 reported in the voluntary part of Table 1). Note this variable uses the term 'specialist producers' in an extended way, encompassing units in the corporate and government sectors.

P7.4 and P6.4: imports and exports of environmental protection services

Imports, exports of EP services should be filled in for CEPA 2, 3 and 4. This means that in the mandatory table in column "Sum of CEPA 1+4+5+6+7+8+9" only CEPA 4 should be reported for P.7, P.6.

These data are normally available from supply and use tables for CPA products 37, 38.1+38.2 and 39 but may also be available for other products, e.g. CPA corresponding to NACE M. When corresponding to CEPA 2, 3 or 4 these characteristics should be included.

Whenever these characteristics are not directly available in supply and use tables, estimates may be found in Balance of Payments (EBOPS) or calculated based on physical data.

Another data source that can be used for exports is EGSS, provided some conditions are met as explained in section 4:

- EGSS must allow distinguishing environmental protection from resource managements, so that only the former are accounted for in EPEA
- EGSS must allow distinguish environmental specific products, and in particular services (as they correspond to EP services in EPEA)
- EGSS must be calculated at CEPA class level or at least allowing a mapping to the CEPA groupings used in EPEA.

Box 16: Imports and exports of environmental protection services

Germany notes (see reference below) that “we generated further data for completing the (output of) market EP services for CEPA 2 and 3 from Supply Use Tables. From the use table, we take data by product groups (37 for CEPA 2, 38 plus 39 minus 38.3 for CEPA 3): Final consumption of households and exports. From the supply table, we used the following data by product groups: imports, other taxes less subsidies on products, (and trade margin). So, we have all variables to calculate total supply (output plus imports plus other taxes less subsidies on products plus trade margins). Because total uses should equal total supply, we are able to calculate the missing variable intermediate consumption by difference.

Source: Federal Statistical Office of Germany (2015) Economy wide environmental protection expenditure accounts for Germany

D21-D31.4: VAT and other taxes less subsidies on environmental protection services

This characteristic consists of three elements:

- VAT
- Other taxes on environmental protection services
- Subsidies on environmental protection services

The first one is by far the most important one. The other two could be nil or negligible but EPEA compilers must analyse the case and confirm it. Many taxes and subsidies on environmental protection are actually in D29-D39 rather than in D21-D31.

The rest of this section focuses on the calculation of VAT on EP services, i.e. the first of these three elements. A full VAT calculation, shedding information on the VAT for each product, in each step of production, and paid by each final user, is a very demanding task. National accounts may have set up a system of VAT matrices calculate it all or a part of it. This could be used by EPEA compilers if such system exists nationally and they can secure access to it. See Box 17 for details.

Fortunately, such a full scale VAT calculation is not necessary for EPEA. This is for two reasons: first the EPEA framework only requires one aggregated VAT figure (with CEPA breakdowns), but no detail by product, producer or final user; secondly, this figure is only needed as part of the transition from the valuation at basic prices to purchaser's prices and thus the interest for analysis in the VAT by itself is limited. This means that a lower accuracy estimate may be acceptable.

Therefore a simplified calculation method is proposed here for EPEA, as follows:

1. Check the VAT rate of EP services, e.g. contacting the national experts on VAT legislation. In particular, identify products at reduced rate, which should be the exception as most EP services will have the standard VAT rate. A one-off exercise may be enough, with occasional but not annual check-ups of changes in VAT legislation. For indication, some products from the EGSS indicative compendium list which may be subject to a reduced rate are listed in Table 40 (the application of this table to national legislations must be checked). Other analyses based on the EGSS operational list of products (on environmental protection) may help. This link from DG TAXUD may help too.⁽⁶²⁾
2. Check if some producers of EP services may be exempt of VAT. Sewage and waste treatment providers may be a case. Most other VAT exempt industries are not related to production EP services, e.g. financial intermediation, insurance, postal service, medical and health services, education, welfare and social services, public broadcasters, organisation of fund-raising events. This is to be confirmed in your country. A one-off exercise may be enough.
3. Consider the purchases of EP services by households and government units coming from market producers (including imports). In order to do so, start from the final consumption and deduct from it the part that is supplied by non-market producers (if any). The final consumption by households will be the lion's share in the total, the final consumption by government will be most of the rest.
4. Consider also the intermediate consumption and GFCF of VAT exempt producers. This intermediate consumption and GFCF of exempt producers may be non-existent (if no producers of EP services are VAT exempt) or very small. The latter may be ignored in a first approximation. This task is facilitated if VAT exempt producers are specialist producers because there is more information available.
5. The sum of results from paragraphs 3 and 4 gives a tax base. Next, apply the VAT rate for each EP services. This can be done with a blanket application of the normal VAT rate plus special calculations for the products at reduced VAT rate.

This gives the non-deductible VAT on EP services, in a first approximation.

⁽⁶²⁾ http://ec.europa.eu/taxation_customs/sites/taxation/files/resources/documents/taxation/vat/how_vat_works/rates/vat_rates_en.pdf

Table 40: EGSS products which may be subject to a reduced VAT rate

EGSS indicative compendium product	VAT Directive basis
Organic agricultural (plant and livestock) products	Category 1 of Annex III
Supporting services to organic agriculture	Category 11 of Annex III
Fuel wood	Article 122
Organic aquaculture products	Category 1 of Annex III
Septic tanks	only in the framework of Categories 10/10a of Annex III
Maintenance and repair services for reducing water losses	only in the framework of Categories 10/10a of Annex III
Wood fired boilers and other appliances	only in the framework of Categories 10/10a of Annex III
Specific equipment for the production of energy from renewable sources: solar panels and photovoltaic cells	only in the framework of Categories 10/10a of Annex III
Goods for thermal and noise insulation mainly in buildings: cork products	only in the framework of Categories 10/10a of Annex III
Goods for thermal and noise insulation mainly in buildings: windows with three insulation layers	only in the framework of Categories 10/10a of Annex III
Goods for thermal and noise insulation mainly in buildings: insulation materials for facades, roofs, and other elements of buildings such as materials made of glass fibre, rock wool, cellulose, polymers and polyurethane and others (e.g. autoclave cellular concrete)	only in the framework of Categories 10/10a of Annex III
Specific equipment produced for environmental protection and resource management products: thermostats for heating and cooling regulation	only in the framework of Categories 10/10a of Annex III
Specific equipment produced for environmental protection and resource management products: thermostatic valves	only in the framework of Categories 10/10a of Annex III
Specific equipment produced for environmental protection and resource management products: heat pumps	only in the framework of Categories 10/10a of Annex III
Specific equipment produced for environmental protection and resource management products: condensing boilers	only in the framework of Categories 10/10a of Annex III
Specific equipment produced for environmental protection and resource management products: solar water heaters	only in the framework of Categories 10/10a of Annex III
Specific equipment produced for environmental protection and resource management products: other	only in the framework of Categories 10/10a of Annex III
Discharge lamps as low pressure lamps (e.g. compact fluorescent lamps) and most efficient domestic appliances	only in the framework of Categories 10/10a of Annex III
Electricity, gas and heat from renewable sources	Article 102
Desalinated water	(only in the framework of Category 2)
Collection, treatment and disposal services for non-hazardous and hazardous waste	only in the framework of Category 18 of Annex III
Materials recovery services	only in the framework of Category 18 of Annex III
Low energy consumption and passive buildings	only in the framework of Categories 10/10a of Annex III
Energetic refurbishment of existing buildings	only in the framework of Categories 10/10a of Annex III
Installation of photovoltaic panels	only in the framework of Categories 10/10a of Annex III
Noise insulation works	only in the framework of Categories 10/10a of Annex III
Public litter and collection of garbage from the street	only in the framework of Category 18 of Annex III

Source: DG Taxation and customs union (DG TAXUD)

This total amount must be distributed by CEPA domain. VAT and other taxes less subsidies on EP services should be filled in for CEPA 2, 3 and 4. This means that in the mandatory part of Table 4 VAT and other taxes less subsidies on EP services in the column “Sum of CEPA 1+4+5+6+7+8+9” only CEPA 4 should be reported.

The split may be done after studying the legislation that applies to EP services (VAT rate) and deduction of subsidies on EP services.

Because the VAT is one of the elements in the transition from supply at basic prices to uses at purchaser's prices, and because an accurate estimate is difficult, it may be used to some extent in the balancing between supply and use to allocate statistical discrepancies. Even if there is no need

to do so for the whole economy (sum of CEPA groups), it may be necessary for balancing supply and use at individual CEPA level.

Box 17: the VAT system and VAT matrices for national accounts

A value-added tax is a type of general consumption tax that is collected incrementally, based on the value added, at each stage of production and is usually implemented as a destination-based tax, where the tax rate is based on the location of the customer. The VAT Directive⁽⁶³⁾ establishes the VAT in the EU, although Member States have some flexibility to adapt when transposing the Directive into national legislation. For instance countries can choose which tax rate they apply as standard rate, which products have reduced rate (within some constraints), etc.

Normally there are two or more tax rates. Each product has one rate, so different products may have different rates. Also producers in certain activities may be exempt of VAT, which means they do not file VAT returns to the tax authority, and thus they cannot charge VAT in their invoices nor can they deduct VAT from their purchases.

In ESA2010, the system of registration is net of deductible VAT. This means that VAT is recorded as being paid by purchasers, not by sellers and only by those purchasers that are not able to deduct the VAT they pay from their VAT liabilities. The greater part of VAT is therefore recorded in the system as being paid on final uses, mainly on household consumption.

The ESA2010 only requires reporting (non-deductible) VAT very aggregated. However national accountants normally need to set up one or several rather detailed 'VAT matrices' to calculate the required aggregates. This is particularly important for balancing supply and use tables (the former being valued at basic prices and the latter at purchaser's prices, and VAT being one of the elements involved in the valuation difference). Such 'VAT matrices' are normally unpublished and their layout/structure/detail is not standardised. They may or may not be available to EPEA compilers. A VAT supply table may look as follows:

Supply table	Producer industry							Total production	of which: exported	Total for use of residents	VAT charged
	1	2	3	4	5	6	...				
Product 1											
Product 2											
Product 3											
Product 4											
Product 5											
Product 6											
Product 7											
...											
Total											

This table reports the output produced, i.e. the tax base. In this example all products have standard VAT rate (shown as medium grey) except products 3 and 5 which have reduced VAT rate (light grey). Industry 4 is exempt of VAT (shown as white). This means this industry does not charge VAT

⁽⁶³⁾ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:347:0001:0118:en:PDF>

in its sales. The column 'total production' is the sum of columns and gives the tax base for each product. There is no VAT charged in the part of the production exported (white), only in the part for use of residents, i.e. calculated as total minus exports. The last column calculates the corresponding VAT by applying to each product the corresponding tax rate. This amount is not the VAT actually paid by the producers, as they can deduct the VAT in their purchasers (i.e. it is the VAT on the output rather than the value added). Instead this is shown in the use table below.

Use table	Intermediate consumption (domestic production or imported)							GFCF (domestic production or imported)							Final consumption government (domestic or imported)	Final consumption NPISHs (domestic or imported)	Final consumption Households (domestic or imported)	VAT paid (non-deductible)
	1	2	3	4	5	6	...	1	2	3	4	5	6	...				
Product 1																		
Product 2																		
Product 3																		
Product 4																		
Product 5																		
Product 6																		
Product 7																		
...																		
Total																		

This is a special 'use table' distinguishing the expenditure by producers on intermediate consumption and GFCF. In particular the detail for GFCF is demanding. This table includes domestically produced inputs as well as imported inputs. Normal producers (i.e. non VAT exempt) can deduct the VAT they paid in their purchases (IC and GFCF) when they report to the tax authority the VAT they charged on their sales, and pay only for the difference. Because deductible VAT is not recorded in national accounts, the corresponding columns in the table are white. Instead the exempt industry 4 cannot deduct the VAT in its purchases. The final users (households, government, NPISHs) cannot deduct the VAT either. The sum of the tax bases in the columns in grey, multiplied by the corresponding VAT rate equals the non-deductible VAT (last column). In practice these values may differ from the collected tax receipts for a number of reasons: time-lags between production and sale, time-lags between sale and tax return, special tax schemes for farmers and small producers, VAT fraud, etc.

Government units fall into two categories in this setting. First, some government units produce certain collective services (like national defence, justice, police, etc.) which are not invoiced to anyone. Conventionally national accounts records that the government consumes those services on behalf of the country, i.e. (collective) final consumption by government. As regards the VAT, this means the VAT the government paid on the inputs (IC and GFCF) needed to produce those services is not-deductible. In the use table this falls in the column 'final consumption by the government' but not the full amount has non-deductible VAT, only the corresponding IC and GFCF. Secondly, some other government units produce certain individual services (like collection of residuals) and may sell them and charge for them, but cannot charge VAT in the invoice because they are not VAT subjects. So also for those units the VAT the government paid on the inputs (IC and GFCF) is not-deductible. This falls in the columns of the exempt producers, like industry 4 in this example.

5.4.2. Table 4: voluntary part

As indicated above, the characteristics of the voluntary part are the same as those of the mandatory part, except that they are reported with the full breakdown by CEPA classes.

The voluntary part is automatically filled in with data from previous tables and from the mandatory part of the table. The reporting of characteristics P7.4 (Imports of EP services), P6.4 (Exports of EP services) and D21-D31.4 (VAT and other taxes less subsidies on EP services) is limited to CEPA 2, 3 and 4. These data are already collected in the mandatory part, so that the voluntary part of Table 4

does not require any new calculation.

Table 4: Total supply - voluntary part	CEPA						
	CEPA 1	of which CEPA 1.1.2 and 1.2.2 (Climate change)	CEPA 2	CEPA 3	CEPA 4	...	CEPA 9
(P1.4) EP output (P11.4 + P13.4 + P1_ANC.4)							
(P11.4) EP market output (= P11.1 + P11.2)							
(P1_ANC.4) Ancillary EP output, legally acceptable valuation (= P1_ANC.3)							
(P13.4) EP non-market output (=P13.1)							
(P2_EPS_SP.4) intermediate consumption of specialist producers *)							
(P7.4) Imports of EP services							
(P6.4) Exports of EP services							
(D21-D31.4) VAT and other taxes less subsidies on EP services							
(SUP_NU.4) EP supply at purchaser's prices available for national uses **)							

Automatically calculated
Not applicable

*) Intermediate consumption of EP services of corporations and general government specialist producers of EP services

**) = P1.4 - P2_EPS_SP.4 + P7.4 - P6.4 + D21-D31.4

SUP_NU.4: environmental protection supply at purchaser's prices available to resident users

This characteristic is calculated automatically as $P1.4 - P2_EPS_SP.4 + P7.4 - P6.4 + D21-D31.4$.

As P2_EPS_SP.4 is defined for each CEPA as the intermediate consumption of all EP services products for the production of EP services, this characteristic is only defined at the level of total CEPA and not for each CEPA individual class.

5.5. Table 5: households

5.5.1. Table 5: mandatory part

Households	CEPA	
	CEPA 2	CEPA 3
(P3_EPS.5) Final consumption of EP services	X	X

X To be filled in

P3_EPS.5: Final consumption of environmental protection services

This characteristic corresponds to the final consumption expenditure of households in EP services. It has to be reported for CEPA 2 and CEPA 3.

As seen in Chapter 4, national accounts use table at A*64 level provides the value of the household final consumption in products 37-39, including also products of CPA 38.3 and 39. However household final consumption in these latter products may be considered as insignificant and the household final consumption in products 37-39 may be assumed to correspond to products 37 and 38.1 + 38.2, i.e., EP services of CEPA 2 and CEPA 3. The only remaining work is to separate the products of CPA 37 and 38.1 + 38.2.

Whenever CPA 37 is directly available in national accounts household final consumption, the final consumption in waste collection and treatment services may be calculated as the difference between the sum of 37+38.1+38.2 and 37.

If national accounts do not separate household final consumption in CPA 37, the household budget surveys for classes 04.4.2 (sewage collection) and 04.4.3 (refuse collection) may be used. However there may be some biases in the results of surveys: first households often pay together sewerage services and water and they may be difficult to separate from the survey results. Secondly, those

payments are sometimes included in the rents paid by households, and therefore not separated. It is thus necessary, before using the results of household budget surveys, to inquire with the person in charge of the household budget survey whether these potential biases are duly taken into account and corrected.

5.5.2. Table 5: voluntary part

Table 5: Households - voluntary part	CEPA					
	CEPA 1	of which CEPA 1.1.2 and 1.2.2 (Climate change)	CEPA 2	...	CEPA 9	Total
(P3_EPS.5) Final consumption of EP services	x	x	X	x	x	x
(P3_ACP.5) Final consumption of specialist EP goods and cleaner EP goods	x	x	x	x	x	x

X	CEPA and characteristics already reported in the mandatory part
x	CEPA to be filled in voluntarily (mandatory characteristics)
x	Voluntary characteristics

*) and acquisitions less disposals of non-produced non-financial assets

As for the other tables, the voluntary part collects complementary data with more detailed breakdowns by CEPA classes.

5.5.2.1. DETAILED DATA FOR THE VOLUNTARY PART

P3_ACP.5: final consumption of EP products other than EP services

This refers to specific EP goods (=connected goods) and cleaner EP goods (=adapted goods). There are no direct national accounts data available. The first step is to establish a list of such products. The table below gives an indication of specific EP goods and cleaner EP goods, including their corresponding CEPA. Those specific EP goods and cleaner EP goods which pertain to the EGSS minimum list of products are highlighted in bold.

Table 41: Specific goods

Products	CEPA
Catalytic converters	1
Particulate filters	1
Services for carburation adjustment	1
Septic tanks installation	2
Collection of septic tank sludge	2
Biological activators for septic tanks	2
Maintenance of septic tanks	2
Bins, rubbish containers	3
Noise protective windows	5
Mufflers/Silencers	5

Table 42: Cleaner goods

Products	CEPA
Alternative fuels (LPG, CNG, LNG)	1
Electric & hybrid, low emissions cars	1
Biodegradable soap and detergents	2
Organic farming products	4

Note that expenditure for the purchase of septic tank installation and noise protective windows should not be included in P3_ACP.5 as they are not products for household final consumption but products for gross fixed capital formation of the NACE L “Real estate activities”, which includes imputed rents of owner-occupied dwellings.

Once a set of specific EP goods and cleaner EP goods has been defined, the appropriate value of expenditure needs to be determined.

The method to estimate these goods should preferably be the ‘price times quantity’ method. This method calculates value as the product of quantities and unit prices. This requires two elements:

- an assessment of the quantities of the products, as far as possible based on existing statistical sources (such as statistics on energy use, on vehicle registration and ownership, production statistics, foreign trade statistics, etc.) or, when that is not possible, on market estimates provided by trade associations, producers or importers, etc.
- an assessment of the unit price (or extra cost per unit) based on price statistics or foreign trade statistics or, when that is not possible, based on expert assessment or based on available information on state aid linked to the use of specific EP goods and cleaner EP goods.

For example, the number of new catalytic converters may be estimated from vehicle registration data, new septic tanks installed may be estimated based on data from producers of septic tanks or from housing statistics, etc. Average prices for these products may be obtained from production statistics, foreign trade statistics or from wholesalers or importers. For catalytic converters, when data on production or on imports are not available, the spare part prices for the main car brands may be obtained from the importers of the cars

As regards the calculation of the unit price, whereas specific EP goods (=connected goods) are valued at purchaser’s prices, cleaner EP goods (=adapted products) should be valued by the “extra cost” compared to a normal equivalent product. Practical methods and example of calculation of extra costs are described in the SERIEE 2002 compilation guide (§ 5.4.3). In practice the extra cost criterion poses manifold practical measurement problems, some of them about deriving the knock-on effects of the extra production costs in margins and VAT (see extract in Box 18). Note that also GFCF on cleaner EP fixed assets are valued at extra costs, and thus have a similar complexity, albeit SBS is a data source. Valuation of cleaner EP goods at extra cost is one topic in the SEEA CF research agenda.

As extra costs can be difficult to survey directly, they may be based on expert assessment and technical knowledge. Information issued from willingness to pay or hedonic pricing analysis, or level of subsidies and tax abatement may also be useful for the assessment of extra costs. Subsidies and tax abatements which reduce the extra cost for purchasers are to be recorded in environmental protection transfers.

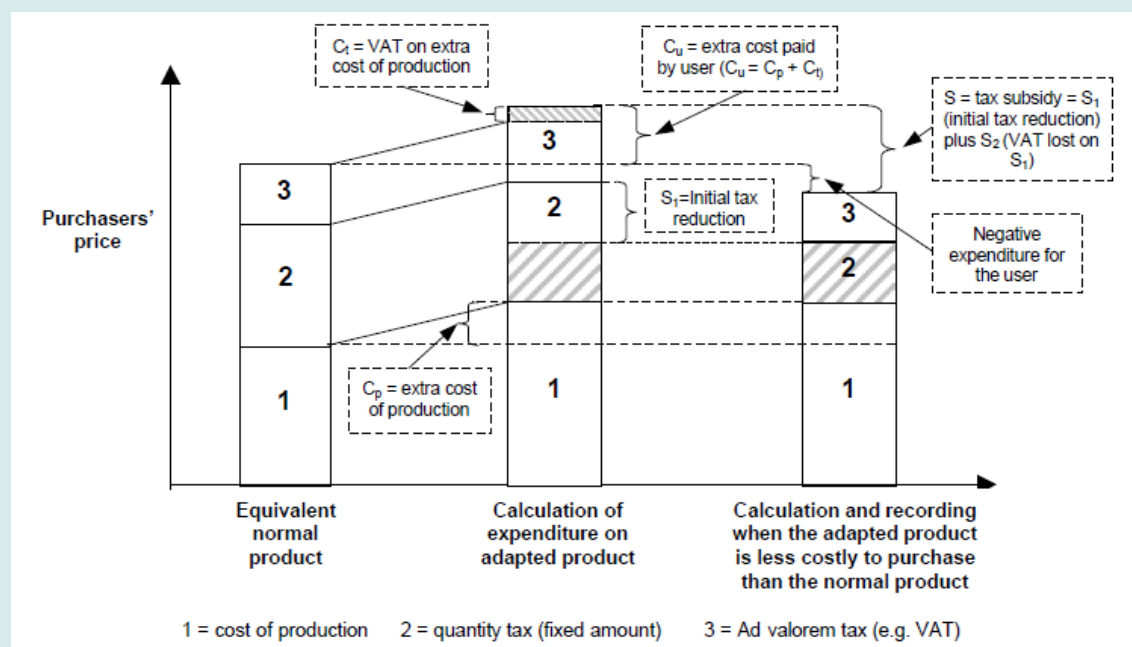
Box 18: Components of costs of production of cleaner EP goods

The basic principles of evaluation of cleaner EP goods (=adapted products) are laid down in the SERIEE manual (§ 2029 seq. and § 2050 seq.). In essence, the preferred concept is to arrive at the purchaser’s price or an equivalent estimate, i.e. the price (or portion of the price) that has to be paid (by the user and/or the financier) in order to make a cleaner product available to the user.

The expenditure on cleaner EP goods is ideally compiled by first measuring the extra production costs and then adding to these extra costs the corresponding share of trade and transport margins as well as the price increase due to taxes (e.g. VAT) so as to arrive at the effect of the higher production costs on the purchaser’s price.

The figure below illustrates this procedure. The left column represents the cost structure of the

'normal product' used as reference. The middle column represents the changes in the cost structure of the cleaner EP good. In particular, C_p in the middle column is the extra cost of production, C_t the taxes on the extra cost of production and C_u the total extra cost paid by the user ($C_u = C_p + C_t$). Extra trade and transport margins (if any) are not shown in the figure but they would be treated in the same way.



For example, in the case of adapted fuels (e.g., low sulphur or low benzene fuels or lead-free gasoline) information on the extra cost of production may be obtained from the refineries or from technical experts. If this is not possible, the compilation procedure can be reverted by calculating backwards from the purchaser's price and removing the effects of taxes etc. to arrive at the extra cost of production for the cleaner EP goods. The extra costs C_p and C_t are the hatched grey boxes in the middle column.

It may happen that the government promotes the use of cleaner EP goods by lowering their purchaser's prices through direct subsidies on products or a through a reduction in taxes on products, the total expenditure (C_u , calculated as above for the middle column) is split between the user and government. The question is which part of C_u is transferred to the purchaser. Two cases may be distinguished:

- Case (i): the purchaser's price of the cleaner EP good is lowered but it is still more expensive than the normal product. The total expenditure (C_u) is equal to the lowered extra costs paid by the user (i.e., the difference between the purchaser's prices of the cleaner EP good and the normal product) plus the subsidy financed by government. Case (i) is not shown in the figure above but a numerical example is given in the table below in this Box.
- Case (ii): the subsidy or tax reduction is so large as to make the purchase of the cleaner EP good cheaper than the normal product. The subsidy is now larger than the extra cost (C_u). The total extra cost (C_u) is given by the sum of the subsidy (S) and the negative expenditure. This is the hatched grey are in the right column. Case (ii) is shown in the right column of the figure in this Box and a numerical example is given in the table below.

The subsidy (S), when it results from a reduction of a quantity tax (i.e., a fixed amount of tax per unit of product, e.g. mineral oil tax) will include two components. The first component (S_1) is the initial quantity tax reduction which is equal to the difference between the quantity tax on the normal product (block 2 of the left column in the figure) and the quantity tax on the cleaner EP good (block 2 of the right column). The second component (S_2) is the VAT revenue lost as a consequence of the lower net price of the cleaner EP good due in turn to the reduced quantity tax. S_2 is the difference between

the VAT revenue that would have been collected if no reduction of taxes on products applied (block 3 in the middle column) and the tax revenue actually collected (block 3 in the right column). S_2 can also be calculated directly by applying the VAT rate to the quantity tax reduction. The table below illustrates the numerical calculation in the various cases.

	Normal product (Figure 3 - left column)	Adapted product		
		Reference case (no tax reduction) (Figure 3 - middle column)	With quantity tax reduction	
			Case (i): still more expensive than normal product	Case (ii): cheaper than normal product (Figure 3 - right column)
(1) Cost of production	100	140	140	140
(2) Fixed (quantity) taxes on products	100	100	80	50
Total value excluding VAT = (1)+(2)	200	240	220	190
(3) VAT (20%)	40	48	44	38
Purchasers' price = (1)+(2)+(3)	240	288	264	228
(4) Extra costs for the user (price of adapted product minus price of normal product)		48	24	-12
(5) Subsidy (S) = $S_1 + S_2$		0	24	60
S_1 = initial quantity tax reduction		0	20	50
S_2 = VAT on quantity tax forgone (20% of S_1)		0	4	10
Expenditure = extra cost (C_u) = (4)+(5)		48	48	48

Source: SERIEE 2002 compilation guide

5.5.2.2. DATA BY INDIVIDUAL CEPA CLASSES

Household final consumption may be calculated as a balancing item between the total supply of EP services at purchaser's prices (calculated from data of Table 4) and the other uses of EP services: exports, intermediate consumption and general government final consumption.

This approach supposes however that EP services are not used as gross fixed capital formation; in this case uses for gross fixed capital formation are to be deducted in order to arrive at households' final consumption expenditure in EP services.

Table 43: Balancing of environmental protection services (by CEPA)

Output at basic prices (not including P1_ANC)	P1.2 + P11.2
+ Imports	P7.4
+ VAT and other taxes less subsidies on products	D21-D31.4
= Total supply	
- Exports	P6.4
- Intermediate consumption of market environmental protection services	P2_EPS_EXT.1+P2_EPS_EXT.2+P2_EPS_EXT.3
- Final consumption of general government	P3_EPS.1
- (Gross fixed capital formation)	
= Final consumption of households	P3_EPS.5

Distribution of household final consumption of environmental protection products other than EP services by individual CEPA class is straightforward when specific EP goods and cleaner EP goods are estimated separately.

5.6. Table 6: transfers

ORGANISING THE DATA

The general government accounts identify current and capital transfers from government sectors to other institutional sectors. An analysis of these data may be particularly useful for government bodies most engaged in environmental protection (e.g. environmental agencies). Information on transfers related to environmental protection should be presented and treated as follows:

Table based on COFOG data: COFOG data only report the total outlays of the different level of general government for environmental protection. Although this information does not indicate the final beneficiaries, it is important because it identifies the source of the transfers and hence, with a proper analysis of the budgetary documents, may allow to derive the final the beneficiaries. This table should include not only transfers under division 05 of the COFOG but also all other environmental protection transfers identified in other divisions (agriculture, international aid...). Data should be reported by CEPA.

Transfers sometimes allow identifying actions for environmental protection that otherwise would not have been identified: the so-called “open ended” transfers. For example, transfers may be identified in the accounts of central government destined to a government agency, NGOs or transport companies but the expenditure of these beneficiaries is not known because they are not surveyed or their annual reports are not available. In such a case, these transfer payments can be used as a basis to estimate the expenditure of these agencies, NGOs or transport companies, e.g. for gross fixed capital formation. Such “open-ended” transfers may be of particular importance in the domains of biodiversity and landscape protection where farmers may receive state aid in various forms targeted to protect the environment. Often, these transfers are the only basis to estimate the value of landscape protection ancillary services produced by farmers.

Table 44: Transfers paid by general government units

Type of transfer paid	Paying general government subsector			
	General government	Central government	State government	Local government
Subsidies				
Other current transfers				
Other current transfers, of which payable to other subsectors of GG				
Other current transfers, of which payable to other institutional sectors				
Corporations				
Rest of the world				
Households				
Capital transfers				
Investment grants				
Capital transfers, of which payable to other subsectors of GG				
Capital transfers, of which payable to other institutional sectors				
Corporations				
Rest of the world				
Households				

Table complementing COFOG data

This table should mainly analyse the transfers received from the rest of the world. For European countries these transfers mostly concern transfers from the EU institutions under the 4th LIFE + program, European Agricultural Fund for Rural Development (EARDF), the EU Framework Programme for research, etc.⁽⁶⁴⁾

⁽⁶⁴⁾ Funds under EARDF may potentially be huge amounts but only the part for environmental protection purpose should be considered in EPEA. There is no standard reporting at EU level that satisfies the data needs for EPEA. Country compilers should check the existence of data sources which allow to estimate these transfers for EPEA

They are described in the Financial Transparency System (FTS) of the European Commission which reports every year by country the beneficiaries of the grants (In FTS “grants” means not only investment grants but also other current and capital transfers) paid by EU budget and European Development Fund, broken down by EU programme and budget line.

The EU financial report also reports payments at a rather aggregated level: payments to sustainable growth and preservation and management of natural resources. However these sources have several drawbacks: the very detailed FTS reports have (multiannual) commitments whereas the more aggregated EU financial report records annual payments; for collaborating projects the amount paid to individual countries cannot be found in the FTS reports the breakdown by environmental domain is not directly available and one has to go through the list of grants in FTS using keywords.

In some countries national databases exist recapitulating EU funding, for example the amounts committed for Common Agricultural Policy.

Finally the complementary table should allow to verify that actions financed by EU funding are effectively recorded in environmental protection expenditure, as ancillary output or investments and to avoid double counting when EU funding transits via government bodies and in particular local governments and / or specific agencies.

Table 45: Transfers: complementary table

European funds	CEPA 1	CEPA 2	...
Current transfers			
to GG			
to NPISH			
to Corporations			
to Households			
Capital transfers			
to GG			
to NPISH			
to Corporations			
to Households			

5.6.1. Table 6: mandatory part

Table 6: Transfers	CEPA				
	CEPA 2	CEPA 3	CEPA 6	sum of CEPA 1+4+5+7	sum of CEPA 8+9
(D3_D7_D92_D99_PAY_GG.6) General government: total transfers paid	X	X	X	X	X
(D3_D7_D92_D99_REC_GG.6) General government: transfers received from the rest of the world	X	X	X	X	X
(D3_D7_D92_D99_REC_CORP.6) Corporations: transfers received from general government and the rest of the world	X	X	X	X	X
(D3_D7_D92_D99_REC_HH.6) Households: transfers received from general government and the rest of the world	X	X	X	X	X
(D3_D7_D92_D99_PAY_RW.6) Rest of the world: total transfers paid	X	X	X	X	X
(D3_D7_D92_D99_REC_RW.6) Rest of the world: transfers received from general government	X	X	X	X	X
	X				

X To be filled in

D3_D7_D92_D99_PAY_GG.6: General government total transfers paid

This characteristic may be directly obtained from COFOG statistics issued from the ESA 2010 transmission program as the sum of D3, D7 and D9 for the COFOG division 05. The data are to be reported by group, which allows distributing data by CEPA according to the correspondence indicated in Chapter 4.

D3_D7_D92_D99_REC_GG.6: General government total transfers received from the rest of the world

COFOG is of no use for this characteristic because it only records expenditure. In general the only transfers received by EU Member States from the rest of the world are EU transfers. Data on those transfers may be retrieved from the FTS and/or the Ministry of Finances and Budget documents.

This characteristic corresponds to a subset of D3_D7_D92_D99_PAY_RW, which records all transfers paid by the Rest of the World and hence received by national institutional sectors, including general government.

D3_D7_D92_D99_REC_CORP.6: Corporations transfers received from general government and the rest of the world

This characteristic corresponds to the current and capital transfers received by the corporations from the Rest of the World and the General government. Whereas transfers from the general government are generally available through public finance statistics, a simplifying assumption, to be verified, is that corporations do not receive directly transfers from the Rest of the World.

D3_D7_D92_D99_REC_HH.6: Households transfers received from general government and the rest of the world

This characteristic corresponds to the current and capital transfers received by households from the general government and the rest of the world sectors. Transfers from the general government are normally available from public finance statistics. If necessary, a simplifying assumption is that households do not receive directly transfers from the rest of the world.

D3_D7_D92_D99_PAY_RW.6: rest of the world total transfers paid

This characteristic corresponds to the current and capital transfers paid by the rest of the world sector to the various resident institutional sectors. As far as EU countries are concerned, only transfers from EU institutions are significant.

D3_D7_D92_D99_REC_RW.6: rest of the world total transfers received from general government

This characteristic corresponds to the current and capital transfers received by the rest of the world sector from the general government (including NPISH). Transfers from the general government are normally available from public finance statistics but this may not be the case of transfers from NPISH (private international cooperation by NGO). Analysis of the accounts of most important NPISH may prove useful.

5.6.2. Table 6: voluntary part

The voluntary part collects more detailed characteristics and a breakdown by individual CEPA classes.

Table 6: Transfers - voluntary part	CEPA					
	CEPA 1	of which CEPA 1.1.2 and 1.2.2 (Climate change)	CEPA 2	...	CEPA 9	Total
(D3_D7_D92_D99_PAY_GG.6) General government: total transfers paid	x	x	X	x		x
(D3_D7_D92_D99_REC_GG.6) General government: transfers received from the rest of the world	x	x	X	x		x
(D3_D7_REC_GG.6) General government: current transfers received from the rest of the world	x	x	x	x		x
(D92_D99_REC_GG.6) General government: capital transfers received from the rest of the world	x	x	x	x		x
(D3_D7_D92_D99_REC_CORP.6) Corporations: transfers received from GG and RW *)	x	x	X	x		x
(D3_D7_REC_CORP.6) Corporations: current transfers received from general government and the rest of the world	x	x	x	x		x
(D92_D99_REC_CORP.6) Corporations: capital transfers received from general government and the rest of the world	x	x	x	x		x
(TAX_EM_PAY_CORP.6) Corporations: earmarked taxes paid	x	x	x	x		x
(D3_D7_D92_D99_REC_HH.6) Households: transfers received from GG and RW *)	x	x	X	x		x
(TAX_EM_PAY_HH.6) Households: earmarked taxes paid	x	x	x	x		x
(D3_D7_D92_D99_PAY_RW.6) Rest of the world: total transfers paid	x	x	X	x		x
(D3_D7_D92_D99_REC_RW.6) Rest of the world: transfers received from general government	x	x	X	x		x
(D3_D7_REC_RW.6) Rest of the world: current transfers received from general government	x	x	x	x		x
(D92_D99_REC_RW.6) Rest of the world: capital transfers received from general government	x	x	x	x		x
(NEGB2N_GG.6) Negative Net operating surplus of market producers in general government sector (non-consolidated)	x	x	x	x		x

X	CEPA and characteristics already reported in the mandatory part
x	CEPA to be filled in voluntarily (mandatory characteristics)
x	Voluntary characteristics

*) GG: general government; RW: rest of the world

5.6.2.1. DETAILED DATA FOR THE VOLUNTARY PART

As for other tables the voluntary part of Table 6 proposes to report on more detailed and complementary characteristic and a disaggregation by individual CEPA classes. The more detailed and additional characteristics are:

- Distinction between current and capital transfers;
- Additional characteristics: earmarked taxes paid by households and corporations and negative net operating surplus of market producers in general government sector.

The separation of current and capital transfers does not need extra work when basic data are organized.

Earmarked taxes differ from environmental taxes; earmarked taxes are to be first identified reviewing the National Tax Lists.

“The definition of taxes earmarked for environmental purposes focuses only on the use of the tax revenue and is different from the definition of environmental taxes based on the tax base. Therefore, some of these earmarked taxes may be levied on tax bases other than those used in the definition of environmental taxes. However, in practice it is often environmental taxes whose revenue is earmarked for environmental purposes so that the earmarked taxes de facto represent a sub-set of environmental taxes” (Environmental taxes a statistical guideline Eurostat 2013 edition).

Once the earmarked taxes identified, the amounts paid collected the payments should be allocated to households and/or corporations and by CEPA according to the tax base. Note however that taxes on pollution are classified as other taxes on production and are paid only by corporations.

NEGB2N_GG.6: negative net operating surplus of market producers in general government sector

The compilation of this characteristic is presented in section 5.1.2.1

5.6.2.2. DATA BY INDIVIDUAL CEPA CLASSES

COFOG data distinguish transfers according to the following groups: CEPA 2, CEPA 3, CEPA 6, pollution management that covers CEPA (1+4+5+7), CEPA 8 and CEPA 9.

The specific work for the voluntary part is to separate transfers of the pollution group between CEPA 1, CEPA 4, CEPA 5 and CEPA 7.

This can only be done when a specific coding of transfers is available.

5.7. Table 7: summary and NEEP

Tables 7.1, 7.2 are completed automatically from information in the previous tables.

Table 7.3 is devoted to NEEP and allows presenting it by institutional sector. The table is divided into two parts:

- one for countries to provide their own estimate of NEEP (in the first part of Table 7.3). This can overcome the limitations of the mandatory part of the questionnaire and even the voluntary part of the questionnaire, which were explained in section 3.4;
- one to confirm the NEEP estimate automatically derived on the basis of the characteristic available in the previous tables of the questionnaire (in the second part of Table 7.3).

Countries can choose any of those two options. Countries can explain the differences between national estimates of NEEP and the estimate calculated automatically in the footnotes area.

Table 46: Summary of Table 7.3 (extract of questionnaire)

Table 7.3. Total economy, total CEPA				
Please complete the cells with national estimates or confirm the calculation below by copying the calculated data to these cells				
	General Government and NPISH	Corporations	Households	TOTAL
National expenditure for environmental protection				

This table is filled in automatically!				
	General Government and NPISH	Corporations	Households	TOTAL
<u>Pro memoria</u> : National expenditure for environmental protection calculated from information available in the questionnaire				

<u>Pro memoria</u> : Components used to calculate institutional sectors' contribution to national expenditure for environmental protection		General Government and NPISH	Corporations	Households
Final consumption expenditure	P3_EPS.7	X		X
Intermediate consumption	P1_ANC.3		X	
	P2		X	
Gross fixed capital formation *	P51G_NP.7	X	X	
EP transfers to / from Rest of the World	- D3_D7_D92_D99_PAY_RW.6	X		
	+ D3_D7_D92_D99_REC_RW.6	X		

P2= P11.4+ P13.4 +D21-D31.4+P7.4-P3.4-P3.7

* and acquisition less disposals of non-financial, non-produced assets

6

Use and presentation of EPEA data

This chapter provides an overview of the possible uses and presentations of EPEA data. First there is a general overview of EPEA can serve policy questions (section 6.1). Afterwards the chapter introduces various descriptive presentations and examples (section 6.2)

6.1. Overview uses of EPEA data

The main goals of EPEA were explained in the early chapters of this handbook. It is worth recalling them here. EPEA aims to measure:

- the environmental protection expenditure incurred by the resident units. This includes the expenditure on environmental protection *products* (including services) and the expenditure related to the *production* of those products;
- who finances that expenditure, in particular if it comes from the rest of the world and the role of the government sector in distributing those funds;
- the supply of environmental protection products and the production and generation of income (employment, labour costs) related to those products, and by extension the exports and imports and competitiveness of companies due to the burden of environmental protection costs.

EPEA data can be used for a variety of purposes, in particular related to those goals. Examples are to:

- assess how much is spent on environmental protection and to what extent environmental protection expenditure (total, by general government, etc.) impacts on total economic expenditure;
- analyse the environmental protection expenditure and its financing by institutional sector and thus provide a picture of the distribution of the efforts across the various sectors of the economy.
- present the level and composition of the efforts that countries or economic sectors make for environmental protection in the various domains;
- assess who produces environmental protection services and whether production is carried out by specialist producers, in respect to other activities or for one's own use to reduce self-produced environmental pressures;
- assess production costs and employment;
- assess to what extent the general government assumes responsibility for such production;
- analyse the economic impact of environmental protection policy – for example, the possible effects on the competitiveness of businesses;
- identify if the more polluting activities are those that spend most on environmental protection;
- analyse if the various users entirely bear the cost for the purchase of the environmental goods and services they use, or are the costs in part borne by other institutional sectors;
- analyse the need for financing of EP activities and to follow up and monitor specific support and

investment programmes. The units that consume EP services or other EP products or invest for EP activities are not necessarily the financing units, i.e. those actually bearing the expenditure from own resources because units may benefit from specific transfers;

- show in environmental performance reviews, for example, what action countries have taken to protect the environment, to serve as an indicator of the response from society for reducing environmental pressure in general, and as a sustainable development indicator;
- at a micro-level as an internal tool to help businesses identify and minimise their costs and report to external stakeholders on action taken, and as input for financial analysts in their business evaluations;
- as a basis for descriptions of the market for environmental goods and services. Expenditure related to environmental protection is also an opportunity for the creation of new markets for goods and services to protect the environment stimulating the development of a greener economy;
- complete analysis based on physical data on environmental protection equipment and plants (such as the capacity and population served by the water treatment plants) for analyses of efficiency; or physical data on pressures managed via environmental protection activities (such as waste management) for analyses of effectiveness or of the degree of application of the “polluter pays principle”, etc.

Moreover, EPEA can also be a useful source of data for other environmental accounts, in particular EGSS and environmental subsidies and similar transfers.

Indicators

Indicators or aggregates can be derived from the accounts to facilitate presentation of the data for the purposes listed above. These indicators identify and highlight in relatively simple terms key changes that are taking place - for example in environmental protection expenditure by domain, in terms of ‘pressures’ exerted on the environment, the state of the environment or ‘responses’ by governments, businesses etc. to improve environmental quality.

Key indicators from EPEA might include the following:

- national expenditure on environmental protection, by categories of users/beneficiaries and financing units and by domain (CEPA classes)
- the demand and supply of EP services and EP-related products
- the net cost of environmental protection
- the contribution of environmental protection activities to economic growth, exports and employment
- the contribution to environmental protection made by different economic sectors.

Since these indicators result from an accounting structure coherent with national accounts, they ensure completeness and avoid double counting and other biases. This is one of the immediate benefits of the accounting approach. Furthermore the EPEA aggregates are closely comparable with national accounts aggregates, so that ratios may be calculated that are true shares. This is the case for example of the indicators such as national expenditure on EP/GDP, gross capital formation for EP over total gross capital formation; household expenditure on EP over household final consumption, government expenditure on EP over government expenditure.

EP output and EP employment can also be compared to the corresponding national aggregates for total output and employment of the economy.

Main breakdowns

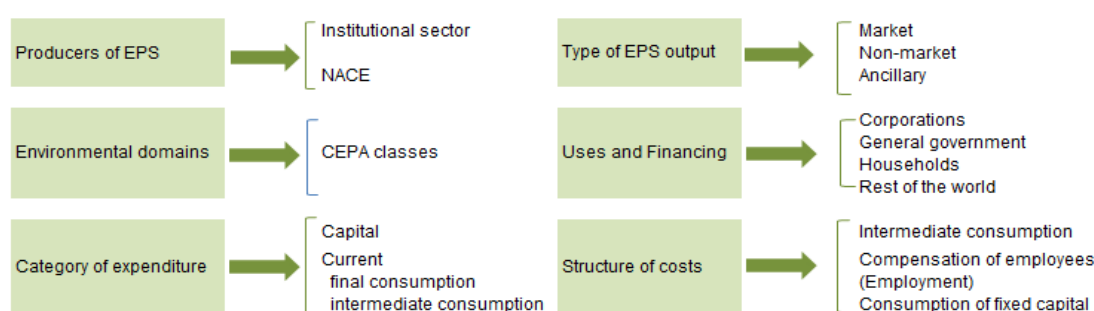
EPEA data can be analysed in many different ways, among others:

- Analysis by **economic variable**. For example, capital expenditure on environmental protection versus current expenditure; financing flows from households and enterprises to general government by means of fees, charges and taxes; grants provided by general government as an incentive to choose environmentally friendly investments, etc.;
- Analysis by **economic sector**. This includes both analysis by individual sector (for example, public

expenditure on environmental protection in relation to total public expenditure) and comparison of the different sectors (for example, the percentage distribution of the financial burden for environmental protection amongst enterprises, households and general government);

- Analysis by **environmental domain**. For example, the percentage distribution of the financial burden of environmental protection amongst waste management, waste water treatment, etc. Combined with the EGSS, the analysis of the EPEA data can also provide an indication of the environmental priorities of the countries;
- Analysis of **time series**. Time series of employment, output and exports can give an indication of the evolution of the producers of EP services, their growth and competitiveness.
- Analysis by type of **environmental output**. Data can be analysed to measure the importance of ancillary activities and the evolution of outsourcing as well as the relative magnitude of market and non-market activities.

Figure 10: Types of analyses



6.2. Descriptive presentation of EPEA data

This section proposes how EPEA data may be presented and indicates some caveats or points for consideration.

6.2.1. NEEP and its main components

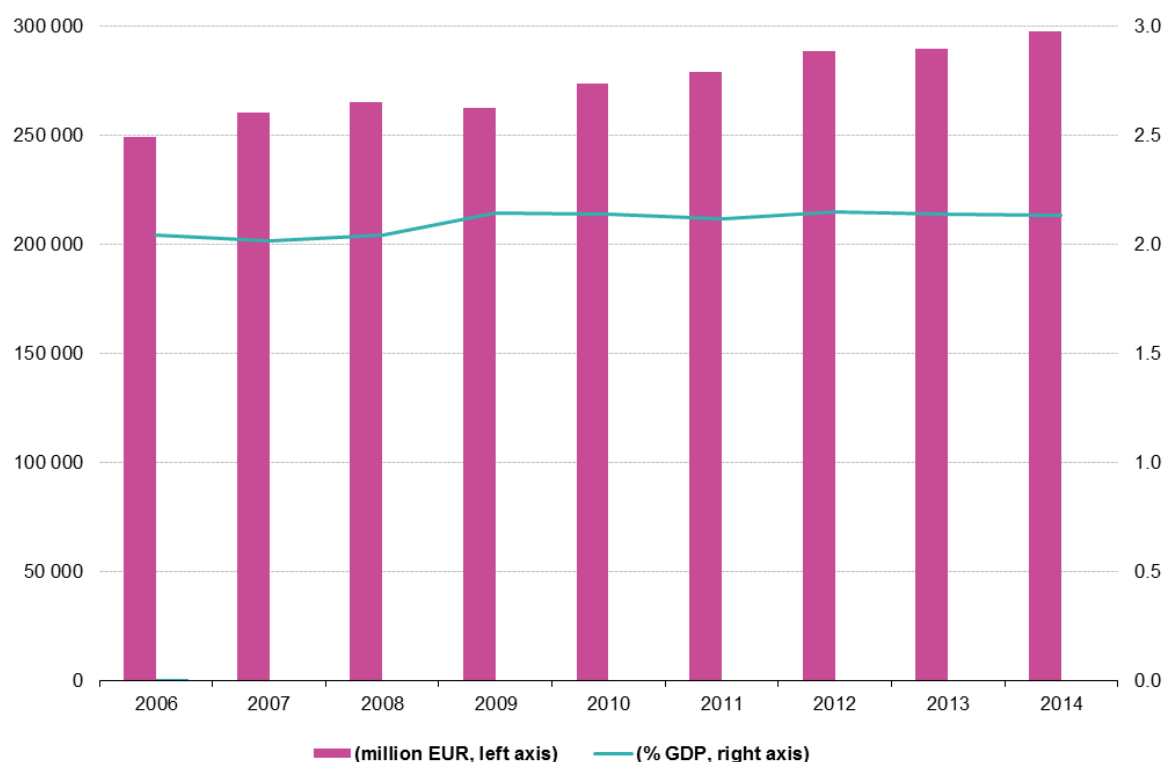
One of the main objectives of EPEA is to estimate the national expenditure on environmental protection (NEEP). NEEP is the headline aggregate of EPEA. Headline aggregates like NEEP are useful to focus the attention of users on a key message.

Indicators can be derived from NEEP, for instance:

- Environmental protection expenditure by inhabitant;
- Share of environmental protection expenditure to gross domestic product (GDP) or gross national income (GNI).

The latter indicates of the relative national effort in favour of environmental protection relative to overall economic activity environmental protection. However, when comparing NEEP to GDP or GNI, it is important to recall that intermediate consumption of EP services is included as a component of NEEP whereas GDP and GNI only include final uses i.e. final consumption and gross capital formation.

Figure 11: National expenditure on environmental protection, EU-28, 2006–14
(million EUR and % of GDP)



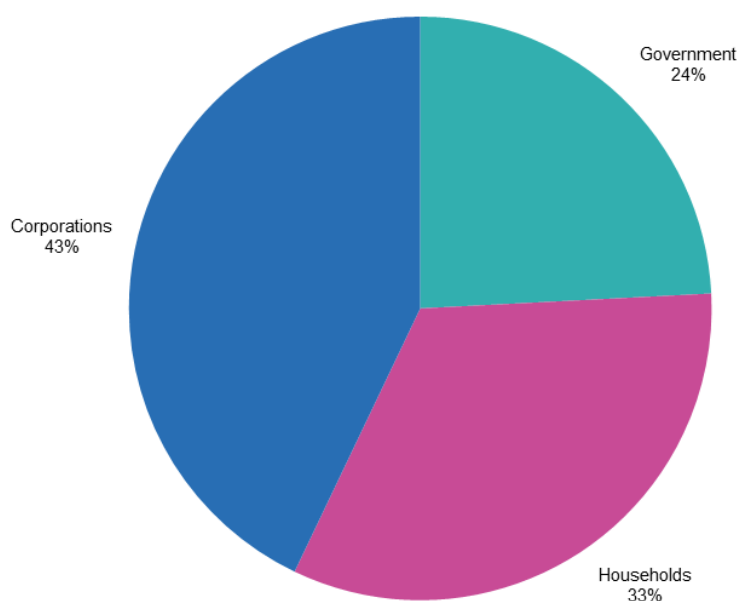
Source: Eurostat Statistics Explained article on EPEA; extracted 13.01.2017

CONTRIBUTIONS TO NEEP BY INSTITUTIONAL SECTOR

NEEP can be further analysed with the contribution by each institutional sector, broken down into government, corporations and households.

Whenever data are reported by sector, users should be informed that the national accounts institutional sectors are grouped for EPEA purposes: the 'government sector' actually includes the NPISH too, although the contribution of the latter is small.

Figure 12: Contributions to NEEP by institutional sector, Poland, 2013
(% of NEEP)



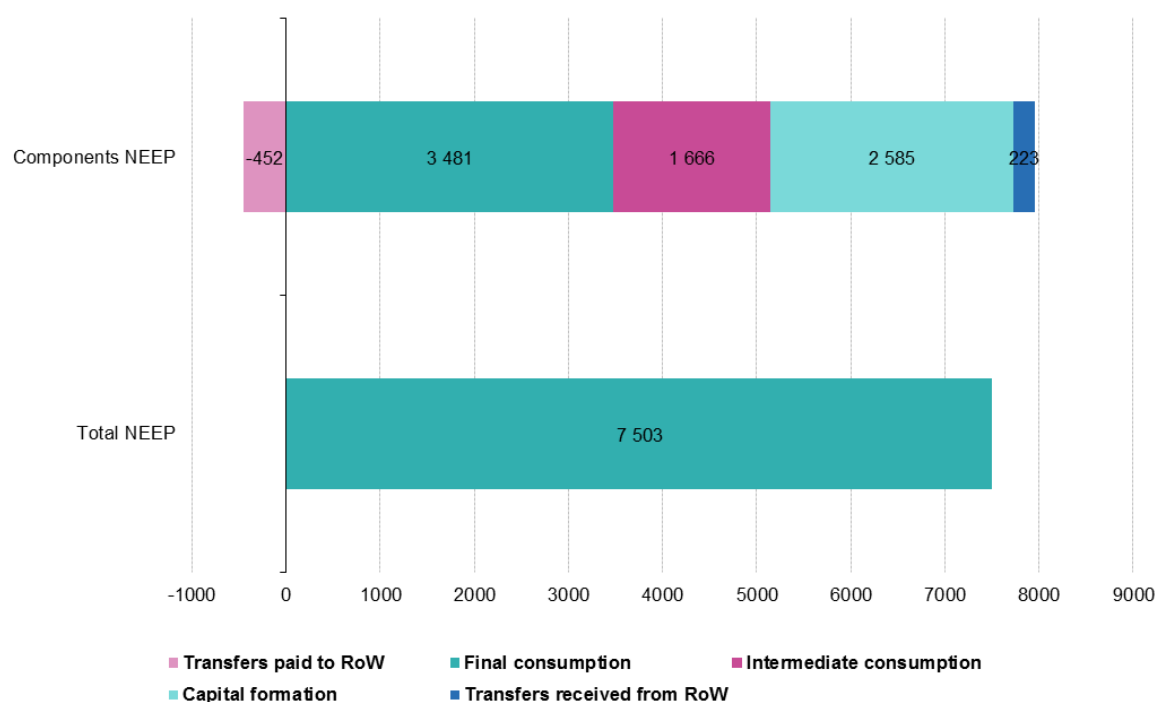
Source: Eurostat online database: env_peps ; last update 12.04.2016; extracted on 08.06.2016; transfers were not equilibrated and were corrected

NEEP COMPONENTS: CURRENT AND CAPITAL EXPENDITURE

Another aspect is presenting and analysing in more detail the main types of expenditure that constitute the NEEP. National expenditure may be subdivided into current national expenditure and capital national expenditure. Current uses include final consumption and intermediate consumption. Current expenditure generates “well-being” in the present whereas capital expenditure lays the groundwork for future prosperity. Capital expenditure may or may not be reported net, deducting the consumption of fixed capital.

Figure 13 presents one possible breakdown of NEEP components

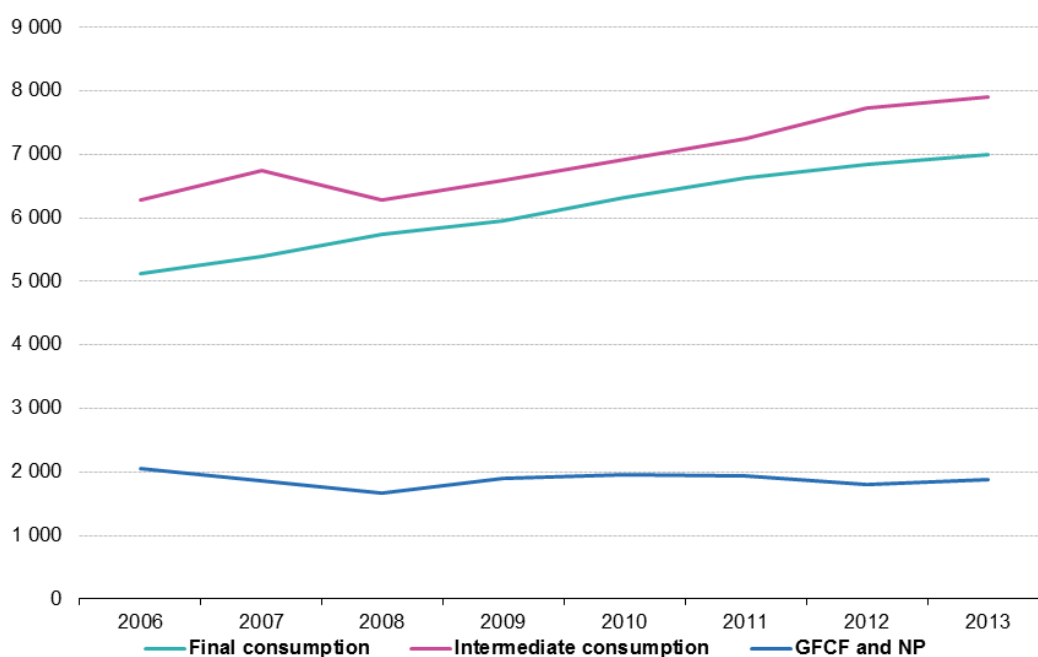
Figure 13: NEEP components, Poland, 2013
(million EUR)



Source: Eurostat online database: env_peps ; last update 12.04.2016; extracted on 08.06.2016; transfers were not equilibrated and were corrected

The evolution of the environmental expenditure and its components can be presented as a time series. For instance, Figure 14 shows that final consumption grows steadily whereas intermediate consumption and gross formation of fixed capital were affected by the economic crisis of 2008.

Figure 14: Time evolution of NEEP components, Belgium
(million EUR)

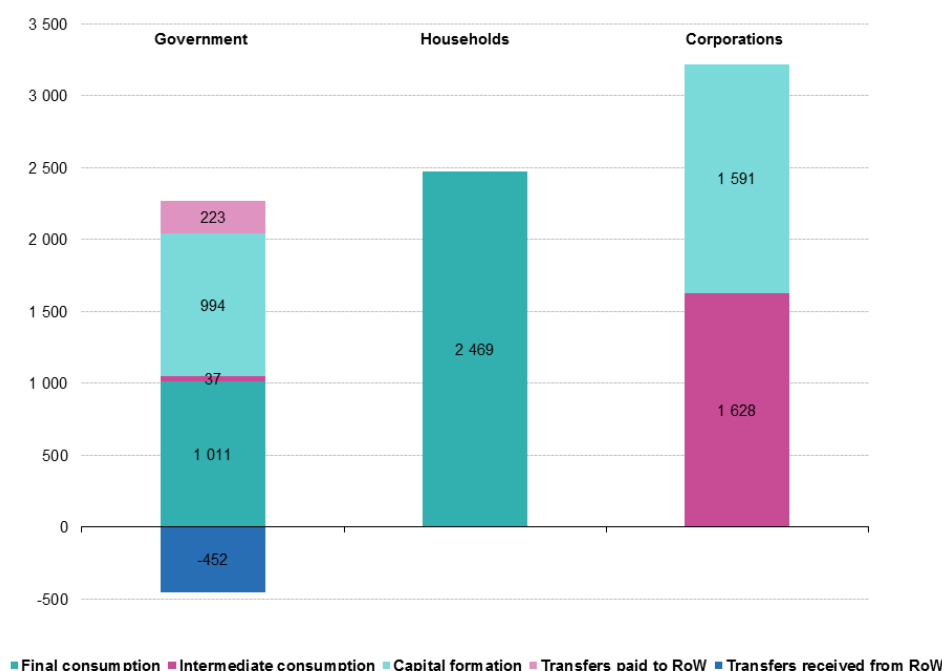


Source: Eurostat online database: env_ac_epneec; updated 08.06.2013 extracted 09.06.2016

Current and capital expenditure can be further reported separately, also broken down by institutional sector.

- Household consumption expenditure on environmental protection is an indicator of what households spend on goods and services to protect natural resources. It can be expressed as a share of the total final consumption expenditure of households;
- General government expenditure on environmental protection shows the role played by the public sector in environmental protection. It is an indicator of the importance of environmental protection with respect to the many other objectives pursued by the government. It can be expressed as a share of general government expenditure;
- Capital expenditure on environmental protection is an indicator of business activity in the field of environmental protection. Fluctuations in this indicator can be considered to anticipate future business activity, business confidence and the pattern of economic growth in the field of environmental protection. Gross capital formation for EP as a share of gross capital formation shows how much of the investments of an economy have the aim of combating resource depletion.

Figure 15: Contributions to NEEP by institutional sector and component, Poland, 2013
(million EUR)



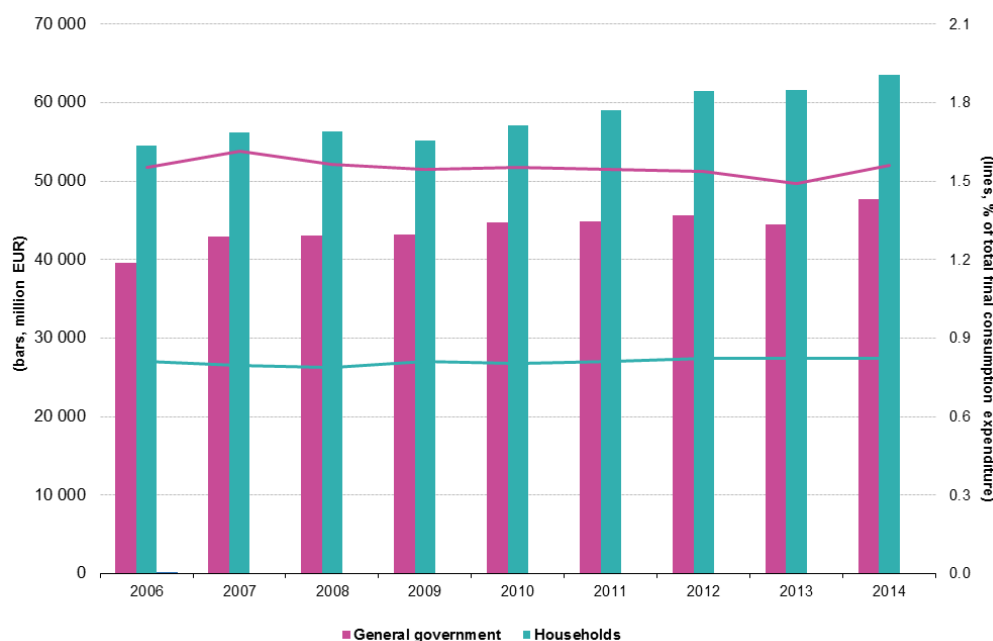
Source: Eurostat online database: env_peps ; last update 12.04.2016; extracted on 08.06.2016; transfers were not equilibrated and were corrected

The various components of the national expenditure on environmental protection can be compared with the corresponding aggregates of national accounts. Final consumption of environmental protection services can be compared with total final consumption of households and general government. In the same way gross capital formation less acquisitions, less disposals of non-produced non-financial assets may be compared to the gross capital formation of the economy as a whole.

For instance, the final consumption expenditure on environmental protection can be compared with the total final consumption expenditure. This ratio indicates the importance of environmental protection relative to total final consumption. This ratio can be reported for government and households together, or separately.

Figure 16: Final consumption expenditure of environmental protection services, EU-28, 2006–14

(million EUR and % of sectorial total final consumption expenditure)

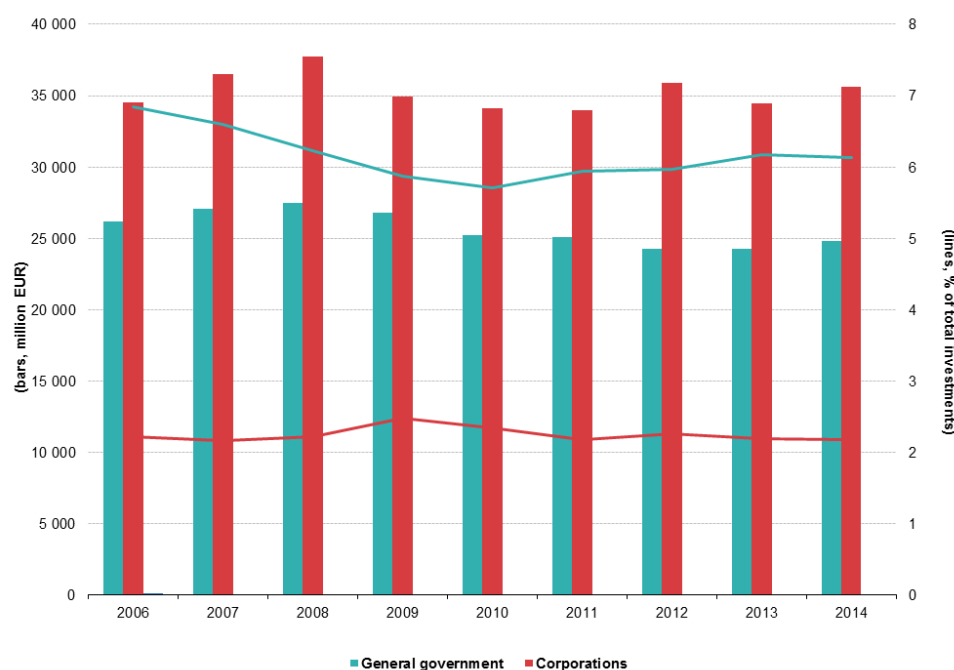


Source: Eurostat Statistics Explained article on EPEA; extracted 13.01.2017

Capital expenditure on environmental protection can be presented by institutional sector (general government and corporations) at current prices and/or as % of total sectorial investments. The latter one analyses their relative importance for each sector by comparing it with the total investment by each sector.

Figure 17: Investment for environmental protection, EU-28, 2006–14

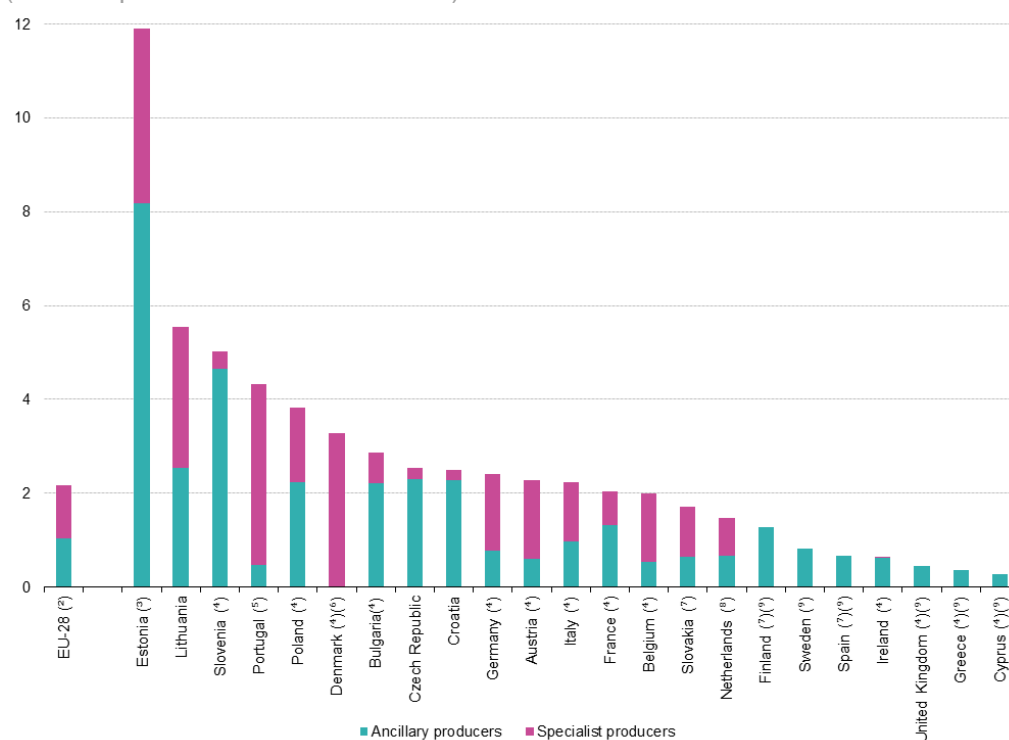
(million EUR and % of total investment)



Source: Eurostat Statistics Explained article on EPEA; extracted 13.01.2017

Corporations' investment for environmental protection can be further broken down by type of producers of environmental protection services i.e., by specialist producers and ancillary producers. Their relative importance in total sectorial investments can be also presented by countries in descending order.

Figure 18: Corporations: investment for environmental protection, 2014
(% of corporations' total investment)



(1) Investment comprises gross fixed capital formation and acquisitions less disposals of non-financial non-produced assets. Luxembourg, Latvia, Hungary and Malta, Romania: not available

(2) Estimates

(3) Ancillary producers: 2012. Specialist producers: 2010

(4) 2013

(5) Specialist producers: 2011

(6) Ancillary producers: not available

(7) 2012

(8) Ancillary producers: 2012. Specialist producers: 2013

(9) Specialist producers: not available

Source: Eurostat Statistics Explained article on EPEA; extracted 13.01.2017

The third main component of the NEEP is the EP transfers. Experience shows that it is more difficult to produce comprehensive estimates of EP transfers than of current or capital EP expenditure. Ideally, current transfers should be distinguished from capital transfers so that the current uses of resident units deduct the financing of current uses by the rest of the world, and capital uses of resident units deduct the financing of capital uses by the rest of the world. If there is not enough information to separate current and capital transfers, EP transfers can be reported together as a separate category of the NEEP, for instance: final consumption, intermediate consumption, GFCF and transfers. Even this may be too demanding if it is not possible to compile the EP transfers. In that case, a more modest goal is to report only the two main components of NEEP: current and capital expenditure.

Whenever reporting EP transfers, emphasis can be put on the national transfers with and from the rest of the world. EP transfers between the national institutional sectors are also relevant. The government sector plays a central role in distributing those transfers, and this role can be highlighted in the presentation of the data.

Whenever reporting transfers, it is important to remark that flows within the government sector are consolidated, i.e. transactions between the different levels of the government sector (Central, Regional and Local) are not included in the EPEA figures. This information is particularly useful for advanced users to correctly interpret the results.

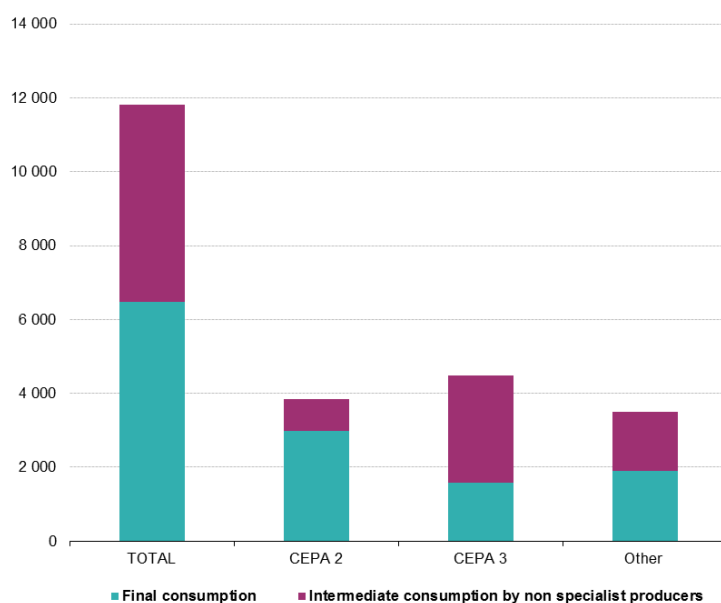
ANALYSIS BY DOMAIN

One of the main features of EPEA is calculating results by environmental protection domain. Analyses by CEPA classes (environmental domains) indicate the environmental domain for which most efforts are made at the national level.

Figure 19a proposes one presentation of uses of EP services by CEPA and Figure 19b the formation of the

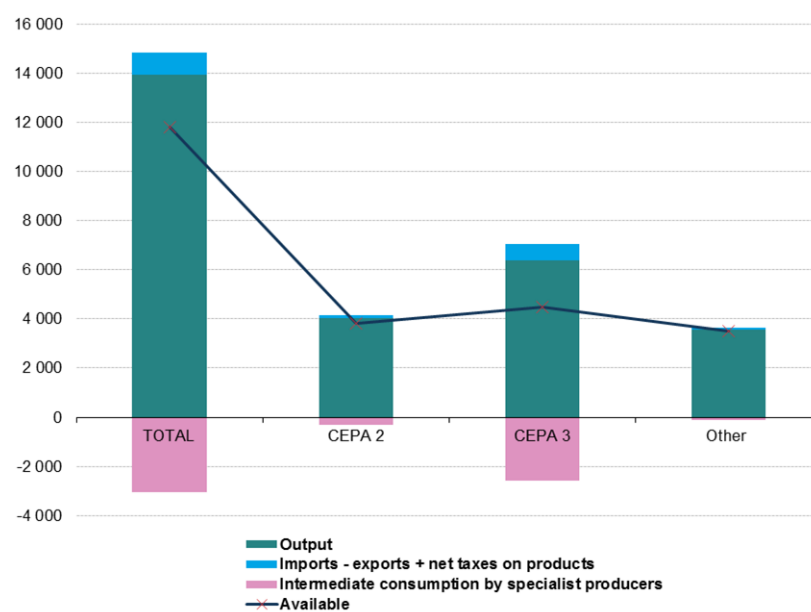
supply of EP services that remains available for resident users.

Figure 19a: Uses of EP services by CEPA, Netherlands, 2013
(million EUR)



Source: Eurostat online database: env_peps ; last update 12.04.2016; extracted on 08.06.2016

Figure 19b: Supply of EP services by CEPA and part that remains available for resident users, Netherlands, 2013
(million EUR)

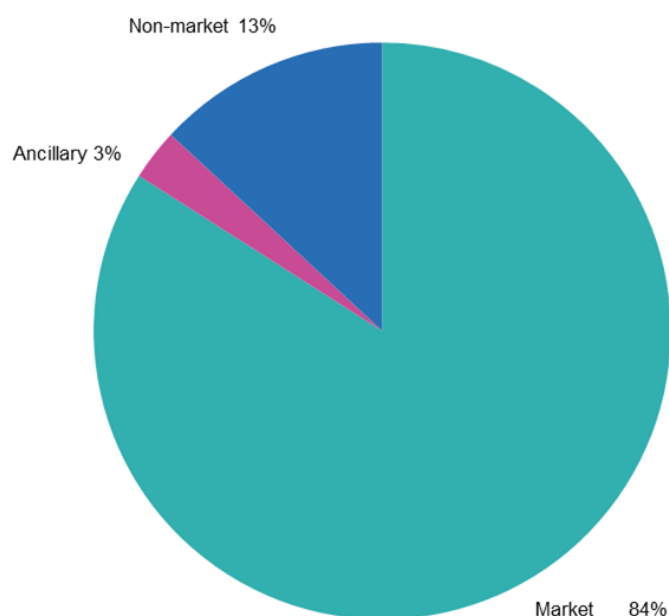


Source: Eurostat online database: env_peps ; last update 12.04.2016; extracted on 08.06.2016

ENVIRONMENTAL PROTECTION OUTPUT

Output can be reported by producing institutional sector (government, corporations), by type of output (market, non-market, ancillary production), by CEPA class (environmental domain) or by a combination of those breakdowns. Figure 20 shows a pie chart with the respective shares of EPEA output.

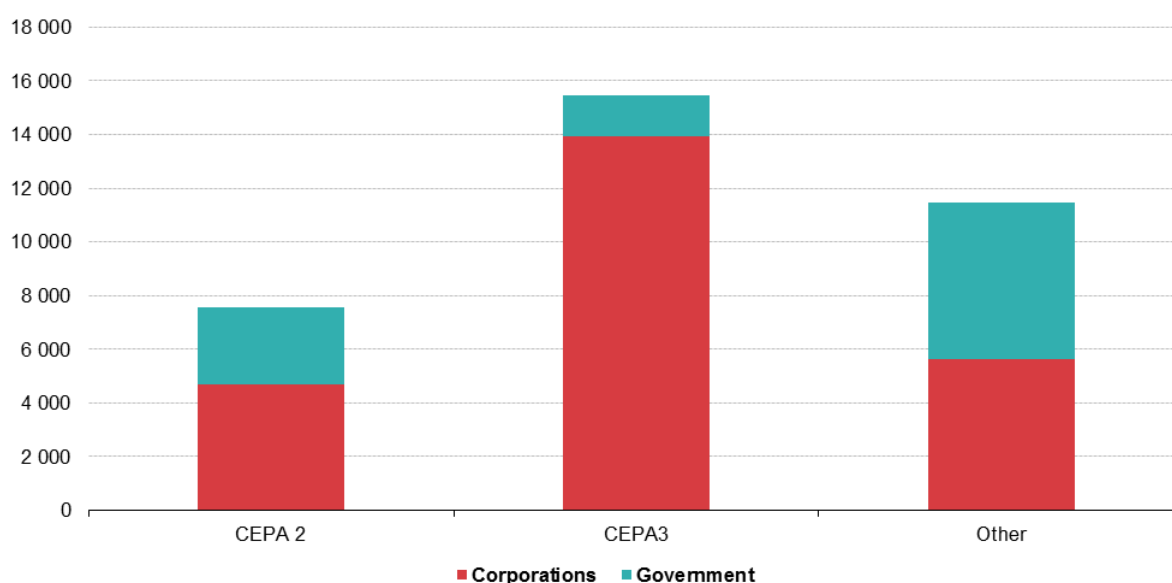
Figure 20: EPEA output by type of output, Belgium, 2013
(% of EPEA output)



Source: Eurostat online database: env_peps ; last update 12 04 2016; extracted on 08.06.2016

Figure 21 shows an alternative presentation of the value of output by producing sector and CEPA, using a bar chart.

Figure 21: Example of presentation of EPEA output by CEPA and sector, France, 2013
(million EUR)

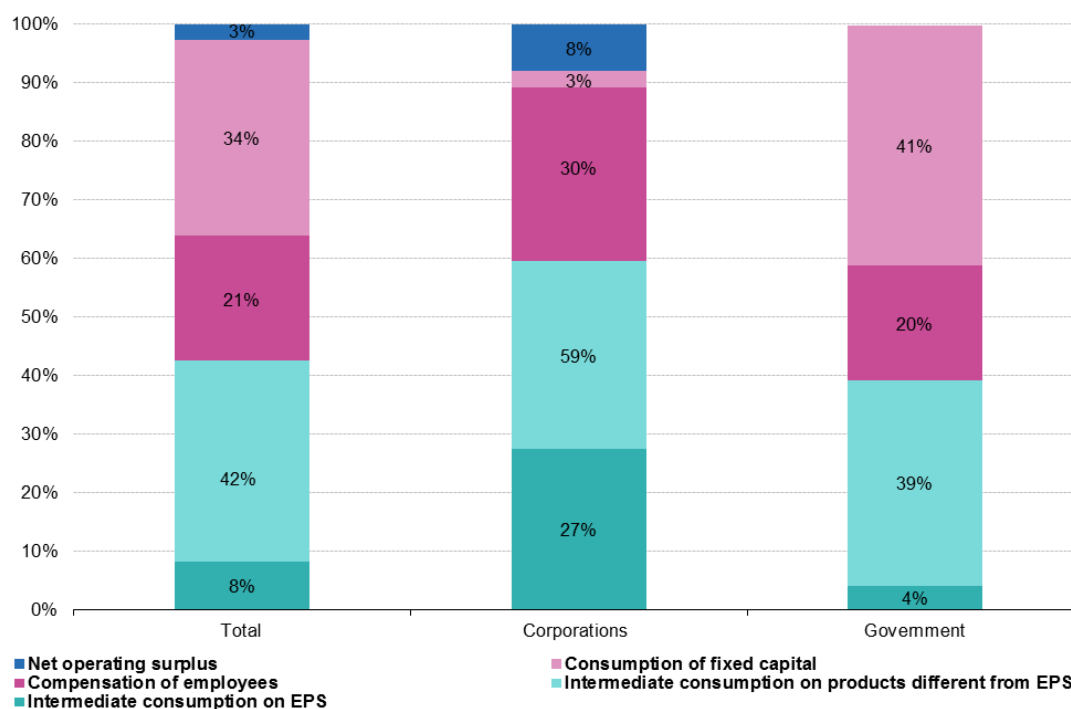


Source: Eurostat online database: env_peps ; last update 12 04 2016; extracted on 08.06.2016

STRUCTURE OF THE PRODUCTION COSTS

The data from the voluntary part of the EPEA questionnaire makes it possible to analyse the structure of the production costs for the various EPEA producers. This analysis may indicate differences between the structure of costs, share of the consumption of fixed capital or share of intermediate consumption of EP services, for producers in the different institutional sectors and CEPA classes (environmental domains). Figure 22 presents an example of the structure of production costs for producers in CEPA 2, with breakdowns by type of production component and institutional sector.

Figure 22: Production costs for EPEA producers in CEPA 2 by institutional sector, Netherlands, 2013
(million EUR)



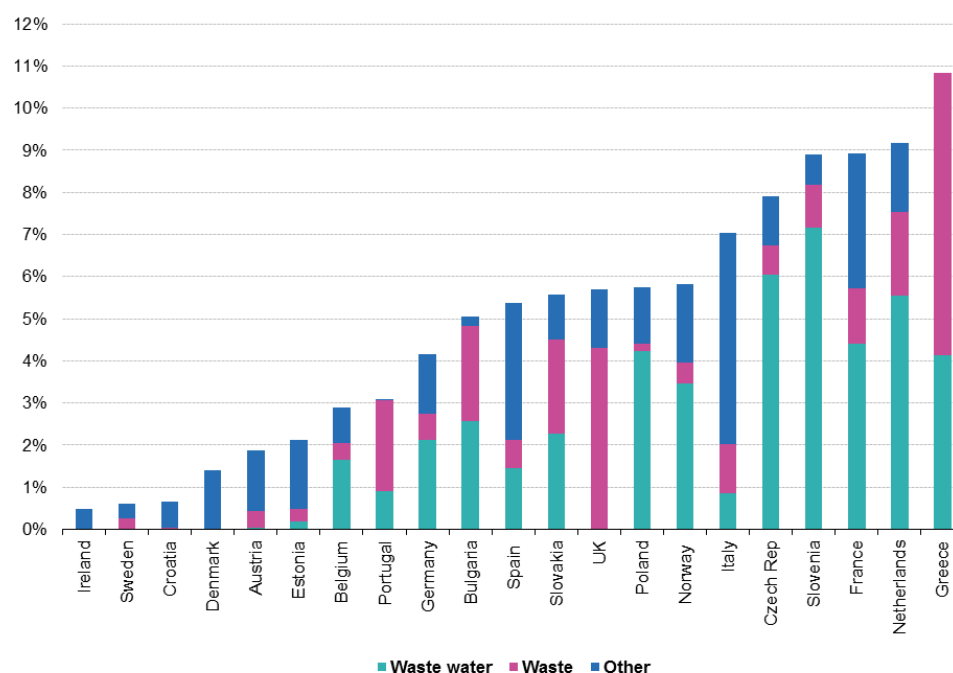
Source: Eurostat online database: env_peps; last update 12.04.2016; extracted on 08.06.2016

RELATING EPEA TO THE NATIONAL ECONOMY

EPEA data allow relating the efforts that countries or economic sectors make for environmental protection in the various domains to the national economy. The various indicators and aggregates of national expenditure on environmental protection can be compared with the corresponding aggregates of national accounts, either for the corresponding institutional sector or for the whole economy. This is one of the greatest advantages of environmental accounts. For instance, final consumption of specific EP products can be compared with total final consumption by households and general government. Similarly, gross capital formation of EP assets (plus acquisitions less disposals of non-produced non-financial EP assets) can be compared to the gross capital formation of the economy as a whole.

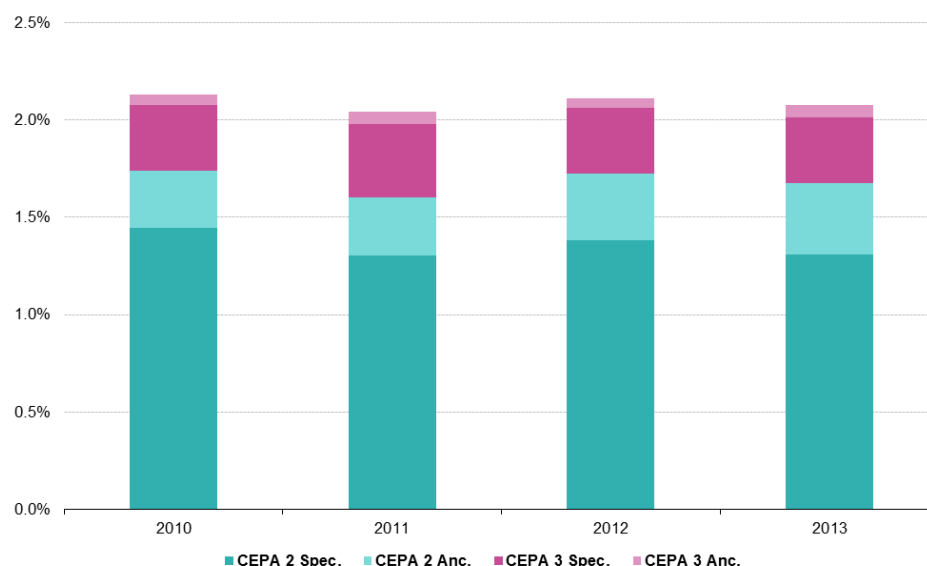
Figures 23a and 23b are two examples of gross fixed capital formation and acquisitions less disposals of non-produced non-financial assets for environmental protection by government and corporations reported as a share of the whole GFCF for the same institutional sector. Data are shown with CEPA breakdowns.

Figure 23a: GFCF of general government for environmental protection, 2012
(% of GFCF by general government)



Source: Eurostat online database: P51G_NP.1 env_ac_pepsgg; GFCF of general government: nasa_10_nf_tr; extracted on 15.06.2016

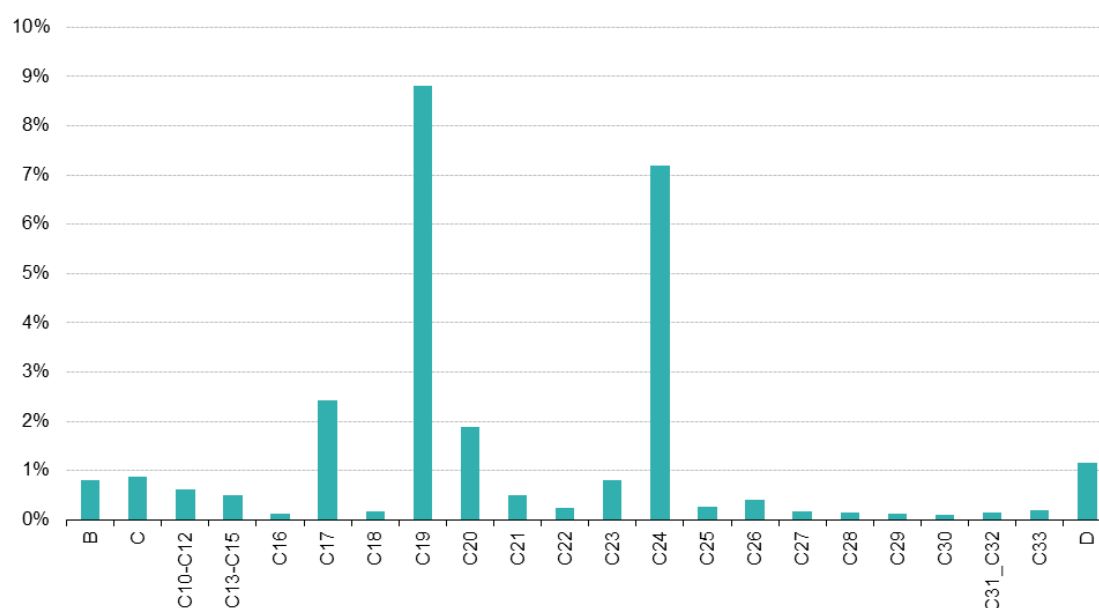
Figure 23b: GFCF of corporations for environmental protection, 2012
(% of GFCF by corporations)



Source: Eurostat online database: P51G_NP.3 env_ac_pepsnsp; P51G_NP.2 env_ac_pestsp; GFCF of corporations: nasa_10_nf_tr; extracted on 10.10.2016

Figure 24 presents another example: the percentage of ancillary expenditure in the gross value added of the NACE sections and divisions B to D. These percentages indicate the costs supported by the industry for in-house environmental protection measures and the impact of environmental protection on the competitiveness of the country. This indicator may be complemented taking into account the intermediate consumption of market EP services. It may be reported broken down by CEPA to show the relative efforts by domain.

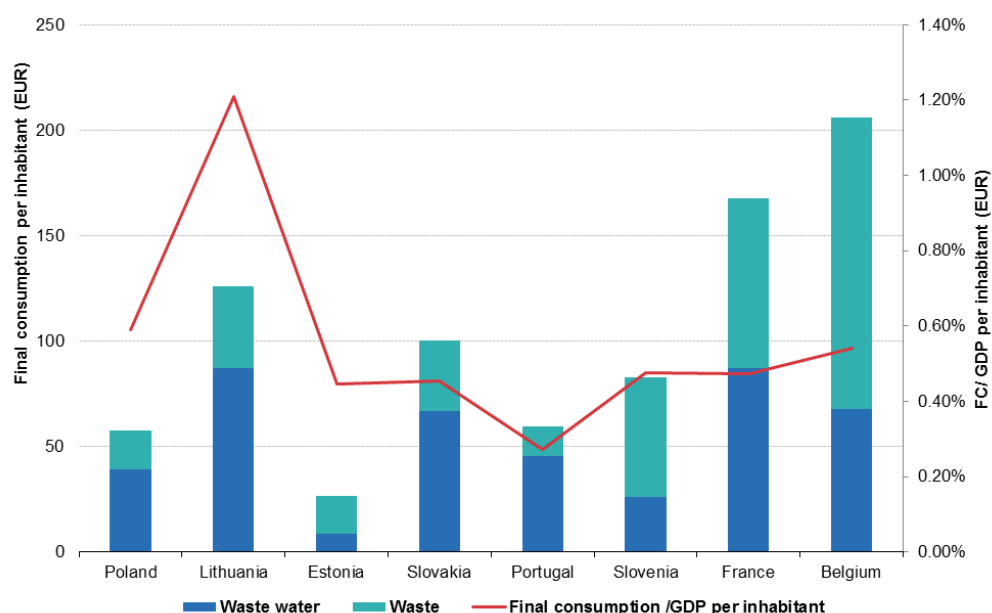
Figure 24: Cost of ancillary activities by NACE, Austria
(% of GVA)



Source: Eurostat online databases: env_peps ; last update 12.04.2016 ; extracted on 08.06.2016 and nama_nace64_c; last update 12.02.2016 extracted on 09.06.2016; nama data refer to 2012 and ancillary output data refer to 2013

Figure 25 presents the household final consumption per inhabitant of EP services on waste water and waste compared to the Final consumption / GDP per inhabitant (average of years 2010 – 2013).

Figure 25: Final consumption of environmental protection services and GDP per inhabitant
(EUR)



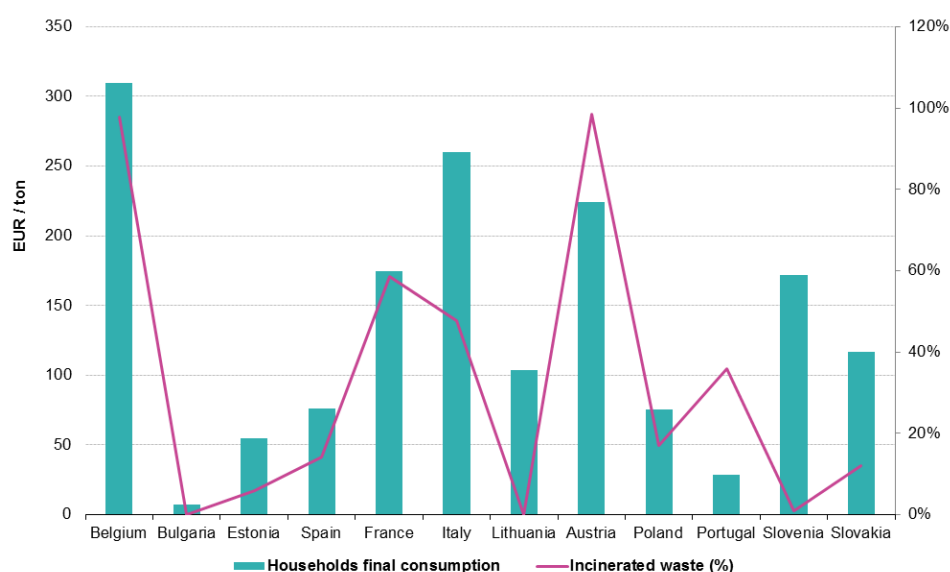
Source: Eurostat online database final consumption (average 2010-2013): env_ac_cepshg; updated on 08.06.2016 extracted on 10.06.2016, average population: demo_gind; GDP: nama_10_gdp

COMBINING EPEA WITH PHYSICAL DATA

EPEA data can indicate the response from society to reduce environmental pressure and move towards sustainability. For this purpose an analysis focused on the links to physical data on pressures (e.g. air emissions, waste generation, etc.) or the state of the environment (e.g. quality of air or water bodies) is recommended.

Relating expenditure and the state of the environment can only be explored with supplementary information from data sources external to EPEA. As concerns physical data, waste statistics is the most developed domain. Data on the generation and treatment of waste is collected from the Member States since 2004 based on waste statistics Regulation (EC) No. 2150/2002, amended by Commission Regulation (EU) No. 849/2010. Expenditure by ton can be calculated from data on household waste generation and household final consumption expenditure on waste management. Figure 26 presents this indicator together with the % of waste incinerated for some countries.

Figure 26: Households expenditure on waste and type of treatment
(EUR/ton and % of incinerated waste)



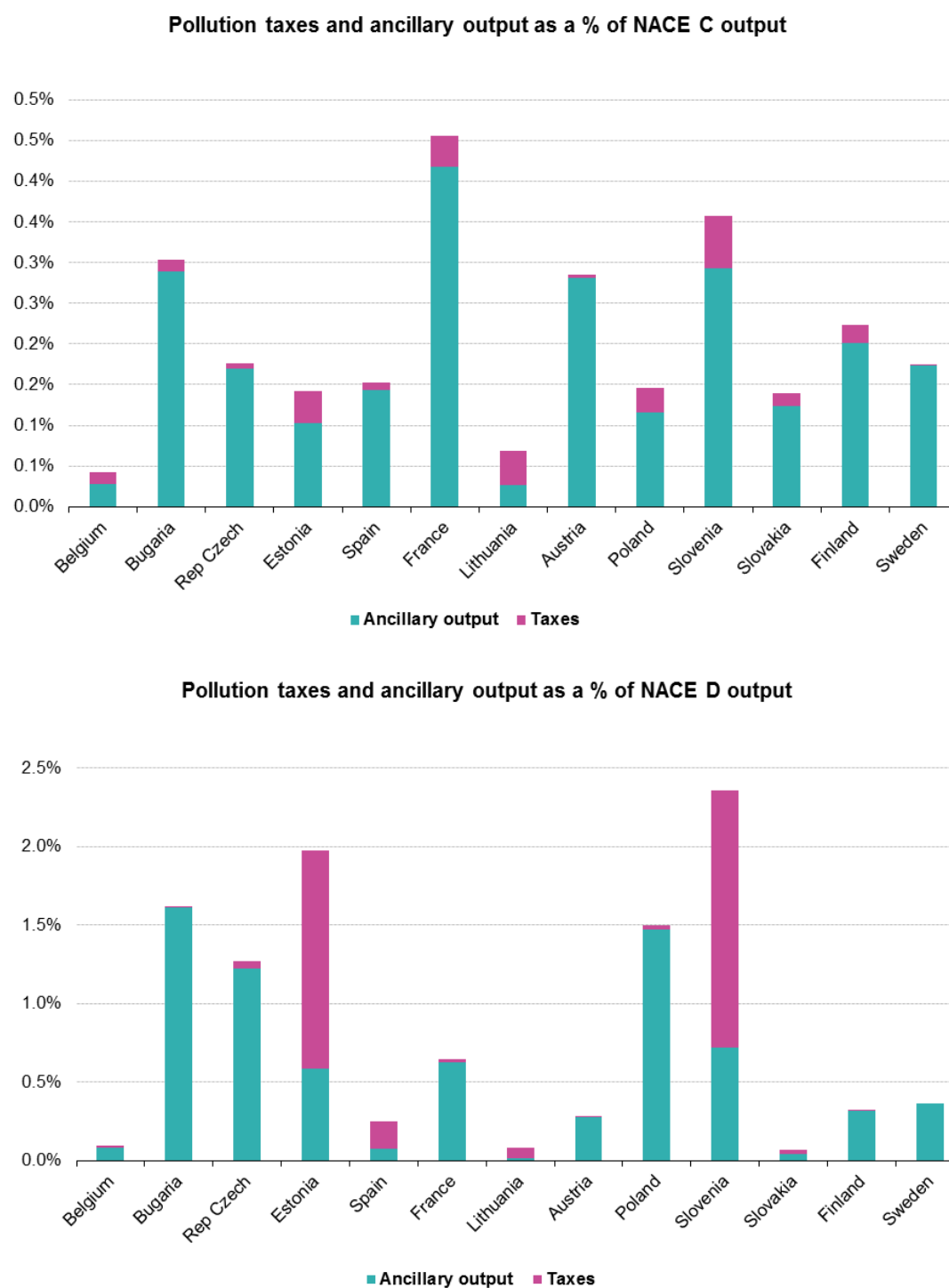
Source: Eurostat online database: households final consumption of EP services: env_ac_cepsgh; quantities of households' waste: env_wasgen; population: demo-gind; % of households waste incinerated: env_wastrt; extracted on 15.06.2016

COMBINING EPEA WITH OTHER ENVIRONMENTAL ACCOUNTS: THE CASE OF TAX DATA

Environmental accounts are a consistent dataset. They use the same definitions from national accounts, classifications, consistent valuations, etc. Although the different modules are still at different stages of development and implementation it may be interesting to explore the relations between the data of these different modules.

Ancillary activities are often considered as a substitute of paying taxes: enterprises may choose to develop ancillary environmental protection activities as a means to avoid paying pollution taxes. It is therefore interesting to add pollution taxes and ancillary output on environmental protection as a measure of the burden that environmental protection exerts on industries. Figure 27 below shows the shares of ancillary output and pollution taxes on NACE C and D output for some countries.

Figure 27: Environmental protection burden on industries



Source: Eurostat online database: ancillary output: env_ac_pepsnsp; taxes: env_ac_taxind2; output: nama_10_a64] extracted on 15.06.216

Annex 1: NACE positions of characteristic EP activities

This annex lists NACE positions where characteristic EP activities other than ancillary activities may be found, with corresponding CPA codes

NACE	Characteristic activities and products
Section A - Agriculture Forestry and fishing	
Division 01 - Crop and animal production, hunting and related services activities	This division explicitly includes organic agriculture, which is a characteristic activity of CEPA 4. There is no specific CPA code for organic agriculture. Also included is the maintenance of agricultural land in good agricultural and environmental condition - CPA 01.61.10 (CEPA 4)
Division 02 - Forestry and logging	
Class 02.40 - Forestry service activities:	Forestry services activities - CPA 02.40.10 includes - forest fire fighting and protection which is a characteristic activity of CEPA 6 (forest fire fighting for landscape and biodiversity purpose)
Section E - Water supply; sewerage, waste management and remediation activities	
Division 36 - Water collection, treatment and supply	May include waste water treatment as secondary activity
Division 37 Sewerage	Corresponds to waste water treatment - CPA 37.00.1 (CEPA 2); includes the maintenance of sewers and drains
Division 38 - Waste collection, treatment and disposal activities; materials recovery	Includes collection, treatment and disposal of waste
Group 38.1 and 38.2	Waste collection - CPA 38.11.1, 38.11.2, 38.11.6, 38.12.1 and 38.12.3 treatment and disposal - CPA 38.21.1, 38.21.2, 38.22.1 and 38.22.2 (CEPA 3 and CEPA 7)
Division 39 - Remediation activities and other waste management services	Includes remediation and clean-up services, air CPA 39.00.13 (CEPA 1); soil and groundwater CPA 39.11.11, surface water CPA 39.00.12 and a part of CPA 39.00.2 (CEPA 4). Also includes decontamination of industrial plants or sites, including nuclear plants and sites
Section F - Construction	
Class 43.12 - Site preparation	According to CPA the product 43.12.12 Excavating and earthmoving works includes contaminated top soil stripping works and land re-creation works however the decontamination of soil itself is excluded The class also includes drainage of building sites and agricultural or forestry land that may be intended to prevent groundwater contamination
Class 43.29 - Other construction installation	Includes CPA 43.29.11 sound or vibration insulation (CEPA 5)
Section M Professional, Scientific and Technical Activities	
Division 71 - Architectural and engineering activities; technical testing and analysis	
Class 71.20 - technical testing and analysis	Includes testing and measuring of environmental indicators: air and water pollution etc. CPA 70.20.11 (various CEPA classes) it also includes technical control of motor vehicles CPA 71.20.14 (CEPA 1 and 5)
Division 72 - Scientific research and development	Includes R&D for environmental protection and resource management-in particular CPA 72.11.12 and 72.19.15 (CEPA 8)
Division 74 - Other professional scientific and technical activities	
Class 74.90 - Other professional scientific and technical activities n.e.c.	Includes environmental consulting activities, CPA 74.90.13 (various CEPA classes)
Section N - Administrative and support service activities	
Division 81 - Services to buildings and landscape activities	
Class 81.29 - Other cleaning activities	Includes street sweeping and cleaning services CPA 81.29.12 (CEPA 3)
Class 81.30 - Landscape services activities	Includes plants for protection against noise, wind, erosion CPA 81.30.10 (CEPA 4, 5)
Section O - Public administration and defence compulsory social security	
Class 84.12 - Regulation of the activities of providing health care, education, cultural services and other social services, excluding social security	Includes public administration of programmes aimed to increase personal well-being CPA 84.12.13 and 84.12.14 (environment), administration of waste collection and disposal operations, administration of environmental protection programmes (various CEPA classes)

Annex 2: List of EPEA characteristics

Production of environmental protection products		General Govt and NPISH	Corporations: specialist and secondary	Corporations: other	Total supply	Households
P1	EP output	M			M	
P11	EP market output	M	M		M	
P11_MA	EP market output from main activities (specialist producers of the corporation sector)		V			
P11_SA	EP market output from secondary activities (non-specialist producers of the corporation sector)		V			
P13	EP non-market output	M			M	
P131	Payments for non-market output of EP services					
P1_ANC	EP ancillary output (legally acceptable valuation)	V	V	M	M	
P1_ANC_ESA	EP ancillary output (ESA-compatible output)			V		
P2	Intermediate consumption for the production of EP services	V	V	V		
P2_EPS	Intermediate consumption of EP services for the production of EP services	V	V	V		
P2_EPS_SP	Intermediate consumption of EP services for the production of EP services by specialist producers		M		M	
P2_NEPS	Intermediate consumption of products other than EP services for the production of EP services	V	V	V		
P51G_NP	Gross fixed capital formation and acquisition less disposals of non-financial, non-produced assets for the production of EP services	M	M	M	M	
INV_EOP	GFCF on specific EP fixed assets (end-of-pipe technologies)			V		
INV_IT	GFCF on cleaner EP fixed assets (integrated technologies)			V		
D1	Compensation of employees for the production of EP services	V	V	V		
D29-D39	Other taxes less subsidies on production of EP services	V	V	V		
P51C	Consumption of fixed capital	V	V	V		
B2N	Net operating surplus	V	V			
RNO	Related non-EP output	V	V	V		
EMP	Employment	V	V	V		
Uses of environmental protection products						
P3_EPS	Final consumption of EP services	M				M
P2_EPS_EXT	Intermediate consumption of EP services for the production of EP services and for other production	V	V	V		
Other transactions						
P3_ACP	Final consumption of specialist EP goods and cleaner EP goods					V
P7	Imports of EP services				M	
P6	Exports of EP services				M	
D21-D31	VAT and other taxes less subsidies on EP services				M	
SUP_NU	Supply of environmental protection products at purchaser's prices available to resident users				M	
EPS_NEEP	National expenditure on environmental protection				V	

M: mandatory characteristic

V: voluntary characteristic

Transfers		General Govt and NPISH	Corporations	Households	Rest of the world
D3_D7_D92_D99_P AY_GG	Current and capital transfers for environmental protection, paid by general government	M: paid			
D3_D7_D92_D99_R EC_GG	Current and capital transfers for environmental protection, received by general government from the rest of the world	M: received			M: paid
D3_D7_D92_D99_R EC_CORP	Current and capital transfers for environmental protection, received by corporations		M: received		
D3_D7_D92_D99_R EC_HH	Current and capital transfers for environmental protection, received by households			M: received	
D3_D7_D92_D99_R EC_RW	Current and capital transfers for environmental protection, received by the rest of the world				M: received
D3_D7_D92_D99_P AY_RW	Current and capital transfers for environmental protection, paid by the rest of the world				M: paid
D3_D7_REC_GG	Current transfers for environmental protection, received by general government from the rest of the world	V: received			V: paid
D3_D7_REC_CORP	Current transfers for environmental protection, received by corporations from general government and the rest of the world	V: paid	V: received		V: paid
D92_99_REC_GG	Investment grants and other capital transfers for environmental protection, received by general government from the rest of the world	V: received			V: paid
D92_99_REC_CORP	Investment grants and other capital transfers for environmental protection, received by corporations from general government and the rest of the world		V: received		
TAX_EM_PAY_CORP	Earmarked taxes for environmental protection, paid by corporations		V: paid		
TAX_EM_PAY_HH	Earmarked taxes for environmental protection, paid by households			V: paid	
NEGB2N_GG	Negative net operating surplus of market producers of the general government sector	V			
D3_D7_REC_RW	Current transfers for environmental protection, received by the rest of the world from general government				V: received
D92_99_REC_RW	Investment grants and other capital transfers for environmental protection, received by the rest of the world from general government				V: received

M: mandatory characteristic

V: voluntary characteristic

Annex 3: CEPA – definitions, explanations, examples of environmental protection activities

This annex presents definitions and explanatory notes of environmental protection activities for the classes of the Classification of Environmental Protection Activities (CEPA). CEPA is a generic, multi-purpose, functional classification which is included in SEEA-CF, Annex I.

The classification of resource management activities is reported in Annex 4, and borderlines between environmental protection and resource management are addressed in Annex 5.

CEPA 1: PROTECTION OF AMBIENT AIR AND CLIMATE

Code	Description
1	Protection of ambient air and climate
1.1	Prevention of pollution through in-process modifications
1.1.1	for the protection of ambient air
1.1.2	for the protection of climate and ozone layer
1.2	Treatment of exhaust gases and ventilation air
1.2.1	for the protection of ambient air
1.2.2	for the protection of climate and ozone layer
1.3	Measurement, control, laboratories and the like
1.4	Other activities

Protection of ambient air and climate comprises measures and activities aimed at the reduction of emissions into the ambient air or ambient concentrations of air pollutants as well as to measures and activities aimed at the control of emissions of greenhouse gases and gases that adversely affect the stratospheric ozone layer.

Excluded are measures undertaken for cost saving reasons (e.g. energy saving).

CEPA 2: WASTEWATER MANAGEMENT

Code	Description
2	Wastewater management
2.1	Prevention of pollution through in-process modifications
2.2	Sewerage networks
2.3	Wastewater treatment
2.4	Treatment of cooling water
2.5	Measurement, control, laboratories and the like
2.6	Other activities

Wastewater management comprises activities and measures aimed at the prevention of pollution of surface water through the reduction of the release of wastewater into inland surface water and seawater. It includes the collection and treatment of wastewater including monitoring and regulation activities. Septic tanks are also included.

Excluded are actions and activities aimed at the protection of groundwater from pollutant infiltration and the cleaning up of water bodies after pollution (see CEPA 4).

Wastewater is defined as water that is of no further immediate value for the purpose for which it was used or in the pursuit of which it was produced because of quality, quantity, or time of its occurrence.

CEPA 3: WASTE MANAGEMENT

Code	Description
3	Waste management
3.1	Prevention of pollution through in-process modifications
3.2	Collection and transport
3.3	Treatment and disposal of hazardous waste
3.3.1	Thermal treatment
3.3.2	Landfill
3.3.3	Other treatment and disposal
3.4	Treatment and disposal of non-hazardous waste
3.4.1	Incineration
3.4.2	Landfill
3.4.3	Other treatment and disposal
3.5	Measurement, control, laboratories and the like
3.6	Other activities

Waste management refers to activities and measures aimed at the prevention of the generation of waste and the reduction of its harmful effect on the environment. It includes the collection and treatment of waste, including monitoring and regulation activities. It also includes recycling and composting, the collection and treatment of low level radioactive waste, street cleaning and the collection of public litter.

Waste are materials that are not prime products (that is, products made for the market) for which the generator has no further use for own purposes of production, transformation, or consumption, and which he wants to dispose of. Wastes may be generated during the extraction of raw materials, during the processing of raw materials to intermediate and final products, during the consumption of final products, and during any other human activity. Residuals recycled or reused at the place of generation are excluded. Also excluded are waste materials that are directly discharged into ambient water or air.

Hazardous waste is waste that due to its toxic, infectious, radioactive, flammable or other character defined by the legislator poses a substantial actual or potential hazard to human health or living organisms. For the purposes of this definition, "hazardous waste" comprises for each country all those materials and products which are considered to be hazardous in accordance with that country's practices. Low level radioactive waste is included, whereas other radioactive waste is excluded (see CEPA 7).

Low level radioactive waste is waste that, because of its low radio-nuclide content, does not require shielding during normal handling and transportation.

Treatment and disposal of waste

Treatment of waste refers to any process designed to change the physical, chemical, or biological character or composition of any waste to neutralise it, render it non-hazardous, safer for transport, amenable for recovery or storage, or to reduce it in volume. A particular waste may undergo more than one treatment process.

Composting and recycling activities for the purpose of environmental protection are included. Often composting is a waste treatment method and the resulting compost provided free of charge or at a very low price. The manufacture of compost classified in division 20 of ISIC/NACE (Manufacture of fertilisers and nitrogen compounds) is excluded.

Group 38.3 of ISICNACE includes recovery of sorted waste as the processing of metal and non-metal waste and scrap and other articles into secondary raw materials, usually involving a mechanical or chemical transformation process.

Also included is the recovery of materials from waste streams in the form of (1) separating and sorting recoverable materials from non-hazardous waste streams (i.e. garbage) or (2) the separating and sorting of commingled recoverable materials, such as paper, plastics, used beverage cans and metals, into distinct categories.

Recovery is not an environmental protection activity; compost and secondary raw materials (as well as products made of secondary raw materials) are not considered environmental protection products.

Disposal of waste is the final deposition of waste on or underground in controlled or uncontrolled fashion, in accordance with the sanitary, environmental or security requirements.

CEPA 4: PROTECTION AND REMEDIATION OF SOIL, GROUNDWATER AND SURFACE WATER

Code	Description
4	Protection and remediation of soil, groundwater and surface water
4.1	Prevention of pollutant infiltration
4.2	Cleaning up of soil and water bodies
4.3	Protection of soil from erosion and other physical degradation
4.4	Prevention and remediation of soil salinity
4.5	Measurement, control, laboratories and the like
4.6	Other activities

Protection and remediation of soil, groundwater and surface water refers to measures and activities aimed at the prevention of pollutant infiltration, cleaning up of soils and water bodies and the protection of soil from erosion and other physical degradation as well as from salinisation. Monitoring, control of soil and groundwater pollution is included. Decontamination of nuclear plant sites is included.

Wastewater management activities (see CEPA 2), as well as activities aimed at the protection of biodiversity and landscape (see CEPA 6) are excluded.

CEPA 5: NOISE AND VIBRATION ABATEMENT (EXCLUDING WORKPLACE PROTECTION)

Code	Description
5	Noise and vibration abatement (excluding workplace protection)
5.1	Preventive in-process modifications at the source
5.1.1	Road and rail traffic
5.1.2	Air traffic
5.1.3	Industrial and other noise
5.2	Construction of anti noise/vibration facilities
5.2.1	Road and rail traffic
5.2.2	Air traffic
5.2.3	Industrial and other noise
5.3	Measurement, control, laboratories and the like
5.4	Other activities

Noise and vibration abatement refers to measures and activities aimed at the control, reduction and abatement of industrial and transport noise and vibration. Activities for noise isolation of dwellings, for the abatement of neighbourhood noise (soundproofing of dancing halls, etc.) as well as activities for the abatement of noise in places frequented by the public (swimming pools, schools, etc.) are included.

Excluded is the abatement of noise and vibration for purposes of protection at the workplace.

CEPA 6: PROTECTION OF BIODIVERSITY AND LANDSCAPES

Code	Description
6	Protection of biodiversity and landscapes
6.1	Protection and rehabilitation of species and habitats
6.2	Protection of natural and semi-natural landscapes
6.3	Measurement, control, laboratories and the like
6.4	Other activities

Protection of biodiversity and landscape refers to measures and activities aimed at the protection and rehabilitation of fauna and flora species, ecosystems and habitats as well as the protection and rehabilitation of natural and semi-natural landscapes. The separation between 'biodiversity' and 'landscape' protection may not always be practical. For example, maintaining or establishing certain landscape types, biotopes, eco-zones and related issues (hedgerows, lines of trees to re-establish 'natural corridors') have a clear link to biodiversity preservation.

Excluded is the protection and rehabilitation of historic monuments or predominantly built-up landscapes, the control of weed for agricultural purposes as well as the protection of forests against forests fire when this predominantly responds to economic reasons. The establishment and maintenance of green spaces along roads and recreational structures (e.g. golf courses, other sports facilities) are also excluded.

Actions and expenditure related to urban parks and gardens would not normally be included but may be related in some cases to biodiversity – in such cases the activities and expenditure should be included.

CEPA 7: PROTECTION AGAINST RADIATION (EXCLUDING EXTERNAL SAFETY)

Code	Description
7	Protection against radiation (excluding external safety)
7.1	Protection of ambient media
7.2	Transport and treatment of high level radioactive waste
7.3	Measurement, control, laboratories and the like
7.4	Other activities

Protection against radiation refers to activities and measures aimed at the reduction or elimination of the negative consequences of radiation emitted from any source. Included is the handling, transportation and treatment of high level radioactive waste, i.e. waste that, because of its high radio-nuclide content, requires shielding during normal handling and transportation.

Excluded are activities and measures related to the prevention of technological hazards (e.g. external safety of nuclear power plants), as well as protection measures taken at workplaces. Also excluded are activities related to collection and treatment of low-level radioactive waste (see CEPA 3).

Definition of radioactive waste

Radioactive waste is any material that contains or is contaminated with radio-nuclides at concentrations or radioactivity levels greater than the "exempt quantities" established by the competent authorities, and for which no use is foreseen. Radioactive waste is produced at nuclear power plants and at associated nuclear fuel cycle facilities as well as through other uses of radioactive material, for example, the use of radio-nuclides in hospitals and research establishments. Other important wastes are those from mining and milling of uranium and from the reprocessing of spent fuel.

CEPA 8: RESEARCH AND DEVELOPMENT

Code	Description
8	Research and development
8.1	Protection of ambient air and climate
8.1.1	Protection of ambient air
8.1.2	Protection of atmosphere and climate
8.2	Protection of water
8.3	Waste
8.4	Protection of soil and groundwater
8.5	Abatement of noise and vibration
8.6	Protection of species and habitats
8.7	Protection against radiation
8.8	Other research on the environment

Research and development (R&D) comprises creative work undertaken on a systematic basis in order to increase the stock of knowledge and the use of this knowledge to devise new applications (see Frascati manual, OECD 1994) in the field of environmental protection.

The class regroups all R&D activities and expenditure oriented towards environmental protection: identification and analysis of sources of pollution, mechanisms of dispersion of pollutants in the environment as well as their effects on human beings, the species and the biosphere. This heading covers R&D for the prevention and elimination of all forms of pollution, as well as R&D oriented towards equipment and instruments of pollution measurement and analysis. When separable all R&D activities even when referring to a specific class have to be classified under this position.

Environmental R&D is further classified in accordance with the 1993 NABS (Nomenclature for the Analysis and Comparison of Scientific Programmes and Budgets, Eurostat 1994).

Excluded are R&D activities related to the management of natural resources.

CEPA 9: OTHER ENVIRONMENTAL PROTECTION ACTIVITIES

Code	Description
9	Other environmental protection activities
9.1	General environmental administration and management
9.1.1	General administration, regulation and the like
9.1.2	Environmental management
9.2	Education, training and information
9.3	Activities leading to indivisible expenditure
9.4	Activities not elsewhere classified

Other environmental protection activities refers to all environmental protection activities which take the form of general environmental administration and management activities or training or teaching activities specifically oriented towards environmental protection or which consist of public information, when they are not classified elsewhere in CEPA. It also includes activities leading to indivisible expenditure, as well as activities not elsewhere classified.

Annex 4: CEPA/CReMA: operational rules for the treatment of borderline cases

CEPA 1 / CREMA 13B

Cleaner versus more resource efficient transport and other equipment

As concerns cleaner and more resource efficient transport and other equipment, it may be difficult to determine whether the equipment is cleaner, because it reduces emissions of air pollutants or noise or is more resource efficient because it reduces consumption of energy.

This handbook proposes the following rule:

If the equipment is specifically designed for reducing air and noise emissions (e.g. hybrid or electric cars) its production should be recorded under environmental protection as a cleaner product. In this case, if it is not possible to identify CEPA 5 (noise and vibration abatement) as main purpose, it should be allocated to CEPA 1.

If the equipment reduces the emission of air pollutants because it is designed to use less energy than normal equipment of similar utility (energy saving domestic / industrial devices or transport equipment) it should be recorded under resource management and therefore be classified under CReMA 13B as resource efficient product.

CEPA 2 / CREMA 13B – CREMA 14

Sewage sludge

Sewage sludge is a by-product of wastewater treatment; its CPA code is 37.00.20. When used as fertilizer in agriculture, sewage sludge may save mineral resources as the nutrients contained in the sludge can substitute nutrients from mineral fertilisers and also save energy that would be used to produce the mineral fertilizers. Sludge may also be an input to biogas production.

This handbook proposes the following operational rules:

- The processing of sewage sludge before its use in agriculture (e.g. decontamination, special processing to increase the nutrient availability for crops) is to be recorded as resource management activity under CReMA 13B (saving of energy that would otherwise be used for producing mineral fertilizer) or CREMA 14 (reducing the depletion of mineral resources) if it can be demonstrated that the value of the processed sludge (either sold or for own use) covers more than 90% of the processing costs on a multiannual average.
- In all other cases the value of processed (or unprocessed) sewage sludge (either sold or for own use) should be recorded under CEPA 2 as by-product.

CEPA 3 / CREMA 11B – CREMA 13B – CREMA 14

There are some waste treatment activities whose by-products contribute to the reduction of resource use. Such activities are the incineration of waste, composting or production of biogas (NACE 38.2). Materials recovery (NACE 38.3: processing of metal and non-metal waste and scrap and other articles into secondary raw materials, usually involving a mechanical or chemical transformation process) is not a waste treatment activity although it includes the recovery of materials from waste streams in the form of (1) separating and sorting recoverable materials from non-hazardous waste streams (i.e. garbage) or (2) the separating and sorting of commingled recoverable materials, such as paper, plastics, used beverage cans and metals, into distinct categories.

According to explanatory notes of the CEPA (see SEEA-CF 2012, Annex I, section A.I), the composting and the recovery of materials are included when they are carried out for the purpose of environmental protection; however compost and secondary raw materials are not considered as environmental protection products.

As an operational rule, *recovery of raw materials from waste and composting*

- should be recorded as a resource management activity and classified under the CReMA 11B, 13B, or 14 if laws or programs (public or private) governing these activities mention resource management as their single main objective,
- may be recorded as resource management activities and classified under the CReMA activities if it can be demonstrated that the value of the recovered materials or compost (either sold or for own use) covers more than 90% of the costs of these activities on a multiannual average,
- are to be recorded under CEPA 3 in all other cases.

When recovery of raw materials from waste and composting is recorded under CEPA 3 compost and secondary raw materials are to be treated as by-products of the activity.

Waste incineration which transforms energy fixed in combusted matters into thermal energy helps avoiding other forms of waste disposal and should therefore, in general, be part of CEPA 3 (see also SEEA-CF Annex I, section A.I). However the production of thermal energy from waste reduces the depletion of fossil energy resources. Therefore, as an operational rule waste incineration:

- should be recorded as a resource management activity and classified under CReMA 13A (from bio-degradable waste) or CReMA 13B (from non-biodegradable waste) if laws or programs (public or private) governing these activities mention resource management as their single main objective,
- may be recorded as a resource management activity and classified under the CReMA 13A or 13C if it can be demonstrated that the value of the recovered thermal energy (either sold or for own use) covers more than 90% of the costs of waste incineration on a multiannual average,
- is to be recorded under CEPA 3 in all other cases.

When waste incineration is recorded under CEPA 3 the energy produced is to be treated as by-product of the activity. Slag should be treated in the same way.

Similarly, as an operational rule, the production of biogas and biofuels from waste

- should be recorded as RM and therefore be classified under CReMA 13A if laws or programs (public or private) governing these activities mention resource management as their single main objective or if the waste only complements other forms of biomass (manure, maize, etc.) in the production of biogas,
- may be recorded as RM and therefore be classified under CReMA 13A if it can be demonstrated that the value of the biogas or biofuels (either sold or for own use) covers more than 90% of the costs of these activities on a multiannual average.
- are to be recorded under CEPA 3 in all other cases.

When the production of biogas or biofuels is recorded under environmental protection (CEPA 3) biogas and biofuels produced are to be treated as by-product of the activity.

An exception to the above rules applies when existing data and modelling approaches do not allow separating out these activities from data on waste collection and treatment activities. In such cases the recovery of raw materials, composting and the production of biogas, biofuels and other forms of energy from waste are to be included in CEPA 3 (even if the above conditions for recording them under resource management hold). If, for example, material recovery is performed by a unit classified under NACE 38.2 (waste treatment and disposal) it may be impossible to separate out the output value of materials recovery.

Likewise, when existing data and modelling approaches do not allow separating out these activities from data on resource management activities, these activities are to be recorded under resource

management (even if the above conditions for recording them under resource management do not hold). If, for example, the production of biogas from waste is performed by a unit classified under NACE 35.21 (manufacture of gas) it may be impossible to separate out the output value of waste treatment.

CEPA 5 / CREMA 13B

Noise abatement versus heat/energy saving

Some activities can serve both, noise abatement and heat and energy saving. Such activities are, for example, insulation works for buildings, including installation of double or triple glazed windows. Only if noise abatement is the main purpose these activities should be recorded under CEPA 5.

As an operational rule these activities are classified in CEPA 5 only if the environmental laws or environmental programs (public or private) governing these activities mention noise abatement as their single main objective.

In all other cases they should be recorded as resource management activities classified under the CREMA 13B; this may also include cases where existing statistical sources do not allow separating out the CEPA 5 related measures from insulation works.

Annex 5: Integrating EPEA and other environmental accounts

The EPEA are part of the set of monetary environmental accounts according to the SEEA-CF framework. Furthermore some monetary environmental accounts are covered in Regulation (EU) No 691/2011, namely: EPEA, environmental taxes and environmental goods and services sector (EGSS) accounts. Amongst them, EGSS and EPEA are the two most interlinked monetary accounts and this Annex focuses mostly on them.

This annex explores how a joint compilation system for EGSS and EPEA may look like, and which advantages it can bring. As known, EGSS accounts analyse the environmental protection and resource management activities from the supply side, i.e., production of environmental products. The environmental protection expenditure accounts (EPEA) analyse the environmental protection mostly from the use side, i.e. expenditure on environmental protection, complemented with information on output, production and transfers. Therefore EGSS and EPEA address environmental activities from complementary angles and they could be expected to be parts of a common entity. Such an integrated framework would provide conceptual unity, present EGSS and EPEA as parts of a bigger system and facilitate compilation, analysis and interpretation of results. A joint compilation would allow exploiting synergies and increasing efficiency. However, whereas EGSS and EPEA share the SEEA-CF conceptual framework and have many common elements, there are also many differences. Similarities and differences were already introduced in section 4.3. All in all, an integrated framework encompassing both EGSS and EPEA is possible but not straightforward.

The basic accounting logic for an integrated framework is as follows. The national accounts conceptual framework ensures that production, expenditure and income provide three alternative and complementary approaches for the measurement of the Gross Domestic Product (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

These principles are useful for several reasons: they make the conceptual framework sound, they allow filling gaps in the estimation process (e.g. using data from the supply side to complete the demand side ensuring that the totals are balanced) and they allow to reconcile independent estimates (e.g. from supply and uses) to improve the quality of the estimates and make them more robust.

These principles can also be applied to the scope of environmental activities. In particular we can apply the first two identities and reorganise to obtain:

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 purchaser's 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 this identity is applied at level of products (environmental goods and services).

Moreover,

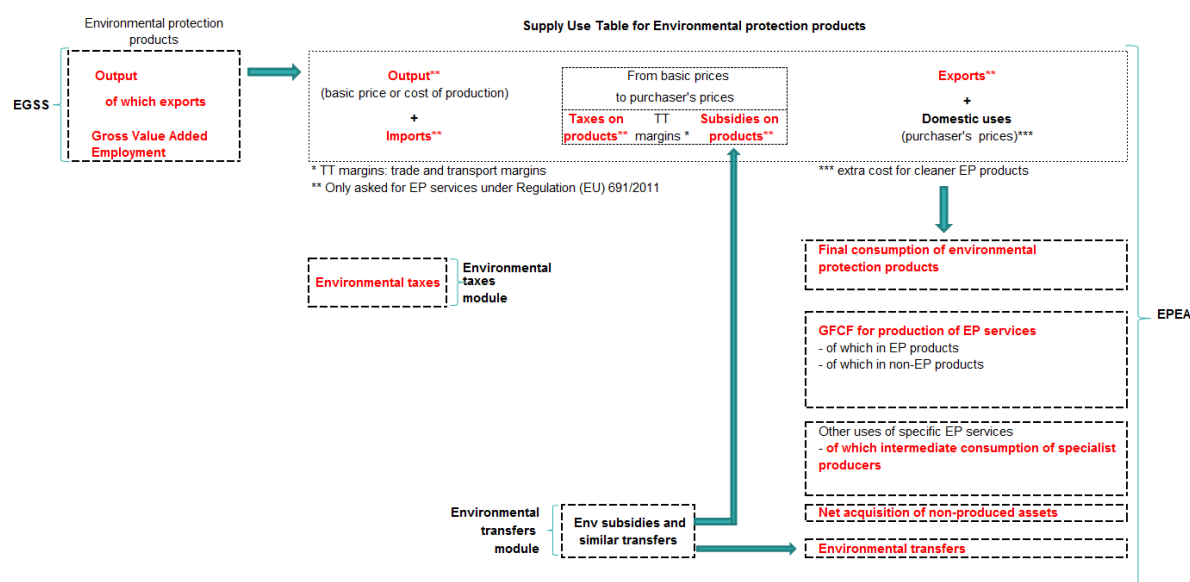
Output of environmental goods and services by environmental production activities

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

Note that this identity is applied at the level of activities or producers.

Some of these transactions must be estimated for EGSS reporting, some for EPEA reporting and some for other accounts (ReMEA, environmental subsidies). These mod environmental accounts are complementary but also with redundancies and overlaps. Figure AN5-1 sketches the elements needed for each environmental account and how they may feed into a broader framework.

Figure AN5-1: Schematic representation of the integrated framework



NB: In red data under Regulation (EU) No 691/2011

One single estimation system encompassing all these elements would create economies of scale, avoid duplication of estimation work, facilitate using one environmental account as source for other accounts (and thus reduce dependencies of external data sources, e.g. SBS), allow balancing

independent estimates (e.g. of supply and demand or supply and income) and improve quality.

In particular, for EPEA, such an integrated system would deliver estimates of output, employment and exports coming directly from EGSS, facilitating estimation of intermediate consumption, GFCF and compensation of employees.

The information sourced from the different modules (e.g. EGSS, EPEA, ReMEA and environmental subsidies accounts) can be put together in a set of accounts. This set of accounts has potential benefits for compilation, comparison of sources, balancing and presentation of the data. Figure AN5-2 shows one possible, simplified set of production and expenditure accounts putting together information from EGSS, EPEA, ReMEA and environmental subsidies accounts. This is an example; different presentations of these accounts with arrangement and level of detail (variables, breakdowns) could be envisaged.

Figure AN5-2: Layout of possible production and expenditure accounts

3.3.1 Environmental production account

	Characteristic activities		Non characteristic activities	Rest of the world	TOTAL
	Government	Corporations			
		Principal and secondary activities	Corporations		
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 Subsidies on environmental products [D221] (-)					
17 Trade and transport margins					
18 imports of environmental goods and services (+)					
19 exports of environmental goods and services (-)					
Total environmental output at purchasers' prices					
20 available for national uses					
21 Extra costs correction (-)					
Total environmental output at purchasers' prices					
22 available for national uses: extra costs					
Supplementary items					
23 Employment					

3.4.1 Environmental expenditure account

	Corporations		Households	General government	NPISH	TOTAL
	Characteristic and non characteristic environmental producers					
	Principal and secondary activities	Own account activities				
1 Intermediate consumption						
2 specific environmental products						
3 cleaner and resource efficient products						
4 Final consumption						
5 specific environmental products						
6 cleaner and resource efficient products						
7 Gross fixed capital formation						
8 specific environmental products						
9 cleaner and resource efficient products						
10 TOTAL national use of environmental products						
Gross fixed capital formation (non environmental) for						
11 characteristics activities						
Acquisition less disposals of non-financial, non-						
12 produced assets for the production of EP service (NP)						
13 Transfers not included in the total use of environmental products						
14 Environmental subsidies on products (D31)						
15 Transfers to the rest of the world (D7, D9)						
16 Transfers from the rest of the world (D7, D9) (-)						
17 TOTAL national environmental expenditure						
18 Environmental subsidies on production (D39)						
19 Social contributions and benefits (D6)						
20 Other current transfers (D7)						
21 Capital transfers (D9)						
22 Earmarked taxes (D2)						
23 TOTAL national environmental expenditure						

Cells in grey are not applicable

Source: Report 'Testing the integration of environmental activity accounts for the Netherlands' (2016)

Ideally, it would be possible to estimate EGSS and EPEA as parts of an integrated supply-use framework. This is the most ambitious possible integration approach (other less demanding approaches are possible too). Accordingly, some data of common interest for EGSS and EPEA may be derived through an appropriate supply-use-balancing given that data on output, export and imports are available. For example, the EGSS account records output of environmental products that are capital goods and become part of the gross fixed capital formation of EP fixed assets in the expenditure accounts. Some categories of output of environmental activities may also be derived from use data. Some examples for such a demand side approach to calculate output of environmental products using gross fixed capital formation data are shown in the Eurostat *EGSS Practical Guide, 2016 edition*.

It makes sense to estimate output (of EP products), intermediate consumption (for production of EP products) and gross value added (from production of EP products) together because they are interrelated. It also makes sense to estimate some other production-related variables as part of the same whole, e.g. GFCF for the production of EP products. Better consistency can also be achieved if e.g. employment and compensation of employees are estimated together.

EPEA and environmental subsidies and other transfer accounts have also some overlaps as regards some transfers that are collected in both accounts, in particular current transfers different from subsidies (i.e. a sub-set of national accounts D.7) and capital transfers (i.e. a sub-set of national accounts D.9). However EPEA and environmental subsidies and other transfer accounts must be streamlined to allow the same compilation system.

For integration of supply and use, filling data-gaps and improving the estimates, it is necessary to transform the valuation of output, exports, imports and domestic uses between basic and purchaser's prices. A transition (supply and use) table is needed for this purpose. For specific EP services this transformation is part of the EPEA account (EPEA questionnaire, Table 4), at very aggregated level. For instance, EPEA characteristic D.21-D.31.4 does not distinguish taxes from subsidies, does not

distinguish any sector breakdown and the CEPA groupings are very aggregated (3 categories). Having more detail would be important. In principle it is also possible to compile the same information to reconcile supply and use of specific EP goods and cleaner EP goods (formerly called connected goods and adapted goods), whose reporting is only made on a voluntary basis in the EPEA questionnaire Table 5 for households.

The layout of a possible set of supply-use tables for environmental accounts is shown in Figure AN5-3.

Figure AN5-3: Layout of possible supply-use tables for environmental accounts

SUPPLY	Output at basic prices					Total output basic prices	Taxes less subsidies on products		Trade and transport margins	Output at purchasers' prices	Imports	Total supply
	NACE	NACE	NACE	NACE	NACE		environ- mental	non environ- mental				
	A	B	C	D							
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											

Source: Report 'Testing the integration of environmental activity accounts for the Netherlands' (2016)

Whereas such system of tables is conceptually sound and useful, there are difficulties to put it in practice. There are two types of issues:

- In spite of the many common methodological elements between EGSS and EPEA, there are several differences too: they do not have identical scope of environmental activities and products (EGSS encompasses resource management in addition to environmental protection), level of detail by CEPA and NACE, detail by institutional sector (which exists for EPEA but not for EGSS), valuation of some transactions (EGSS values cleaner and resource efficient products at extra costs), etc. A more complete list of differences is found in section 4.3.1.

The main impediment is the different level of detail by CEPA in EGSS and EPEA, the absence of institutional sector breakdowns in EGSS, and the different valuation of cleaner and resource efficient products. These obstacles can be overcome but they require adjustments in EGSS and EPEA.

- The estimation approach for EGSS and EPEA may also be quite different: EGSS normally defines first a 'universe of study' based on lists of activities and/or products, which leads to a universe of producers, which is then considered for a systematic compilation, typically NACE by NACE. Estimation of market and non-market producers may or may not be done in one go. The estimation is undertaken by type of producer (market producers, non-market producers, producers for own final use) rather than by institutional sector. Assignment to CEPA comes as a by-product of the NACE coding. On its side, EPEA normally does not start from a 'universe of study' based on a list of activities or products. Actually a product-based approach is rare. The EPEA approach is rather to focus on the main elements (government, specialist producers) and complete afterwards with the smaller bits (ancillary activities). This is done separately for current expenditure (final consumption) and capital expenditure (GFCF). Correspondingly the estimation approach is organised by institutional sector, with different sources for each institutional sector. Estimation is done by CEPA, case by case, possibly using different sources for each CEPA.

There are also ways to overcome these differences, in particular with more integration between CEPA and the EGSS operational list. The entries in the EGSS operational list can be given as examples in the explanatory notes of CEPA, the mapping between the operational list and CEPA categories can be further developed.

Last but not least, it must be noticed that the integrated system sketched in Figure AN5-1 would be an extension of the EGSS and EPEA for reporting to Eurostat. The actual additional size of this extension is a question of choice: it would depend on how many elements are integrated in this estimation system and the level of detail chosen (e.g. by CEPA, NACE, etc.). The bigger the size, the bigger the potential benefits but also the more production costs. A question for discussion is where is the best balance between the additional work required for this estimation system and the benefits in terms of avoiding duplicated work, quality improvements.

As stated above, a fully integrated system based on a supply-use table would be the most ambitious, most beneficial approach, but also the most demanding one. Besides a fully integrated estimation system, it is actually possible to consider smaller, less demanding alternatives. For instance:

- One integrated estimation system for EGSS and EPEA with no supply and use tables. That approach would be less demanding but not enjoy full benefits, e.g. consistency checks;
- Separate estimation systems for EGSS and EPEA with some overlapping elements. Those elements would be estimated only once and used in both EGSS and EPEA;
- Independent estimation systems for EGSS and EPEA. Estimates for some overlapping elements would be cross-checked for quality assurance.

All in all, an integrated estimation system has advantages and disadvantages. Integration leads to economies of scale and better quality estimates. However integration tends to increase the size of cells to be estimated beyond the Eurostat questionnaires; it requires working the estimates at the

same classification levels (ideally NACE divisions and CEPA-CReMA classes), and adjustments in concepts and definitions to make them fit together tight, e.g. the definition of environmental taxes is not at all the bit to reconcile the EGSS output at basic prices with the EPEA demand at purchaser's prices.

The benefits from integration and the costs associated may vary from country to country and in practice there may or may not be a wide gap between the estimation procedures for EGSS and EPEA. It is risky to make a blanket statement on the feasibility and cost-savings of a fully integrated estimation approach for EGSS and EPEA, but in general there seem to be many difficulties for such a system that would undermine its advantages, unless EGSS, EPEA and the other monetary environmental accounts are revamped top-down to make them fit together. At this stage of advancement in an integrated framework for the monetary accounts, it is necessary to gain practical experience on the costs and benefits of common estimation procedures for the overlaps between EGSS and EPEA. This is something that national producers are better placed to do than Eurostat. Countries could test such systems and assess the costs and benefits for them, given their national data sources and national estimation procedures. In the last years Eurostat has offered grants to support financially such tests. The intention is to continue doing it in the next years. Only after gaining some practical experience there can be a rebalance with the theoretical development so far.

Annex 6: List of pilot exercises

This list was last updated in January 2017. Reports of EPEA pilot exercises may be found in [CIRCABC](#) (access to registered users)

Federal Planning Bureau (2014) [Environmental Protection Expenditure Accounts for Belgium: 1997-2011](#)

Federal Planning Bureau (2015) [Environmental Protection Expenditure Accounts for Belgium: 1997-2013](#)

Statistics Denmark (2012) [Danish Environmental Expenditure Accounts 2008](#)

Statistics Denmark (2016) [Improvement of the Danish Environmental Protection Expenditure Accounts](#)

Federal Statistical Office of Germany (2015) [Economy wide environmental protection expenditure accounts for Germany](#)

French Ministry of Ecology, Sustainable Development and Energy - Observation and Statistics Department (2015) [Methodological assistance for the environmental protection expenditure accounts](#)

Hungarian Central Statistical Office (2015) [Environmental Protection Expenditure Accounts in Hungary](#)

Statistics Lithuania (2015) [Environmental protection expenditure accounts and resource management accounts](#)

Statistics Netherlands (2011) [Environmental protection expenditure accounts for the Netherlands](#)

Statistics Netherlands (2011) [Environmental expenditures from the Netherlands in foreign countries](#)

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Statistics Netherlands (2013) [EPE estimation methods for NACE 45-96](#)

Statistics Netherlands (2016) [Testing the integration of environmental activity accounts for the Netherlands](#)

Central statistical Office of Poland (2014) [European environmental economic accounts module for environmental expenditures Report and methodology description](#)

National Institute of Statistics of Romania (2013) [Environmental Accounts](#)

Statistics Finland (2012) [Environmental protection expenditure of public sector](#)

Statistics Sweden (2009) [Environmental Protection Expenditure Accounts in Sweden – a pilot application and analysis](#)

Statistics Sweden (2015) [Meeting new data requirements – An evaluation of Environmental Protection Expenditure Accounts in Sweden and its implementation](#)

Statistics Norway (2013) [Evaluation of requirements for the proposed module on EPEA amending Regulation No 691/2011 on European environmental economic accounts](#)

Statistics Norway (2015) [Environmental Protection Expenditure Accounts](#)

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Environmental protection expenditure accounts

HANDBOOK

The environmental protection expenditure accounts measure the economic resources devoted to all activities undertaken to preserve and protect the environment. This information may be used to understand society's response to environmental degradation and to help to assess the effective use of economic resources to reduce pressures on the environment. This handbook aims to support the data compilers in the process of data collection, compilation and reporting to Eurostat by explaining the underlying conceptual framework (including the scope, definitions and classifications), recalling the reporting obligations under Regulation (EU) No 691/2011 and suggesting possible applications and presentations of the results.

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