

Environmental goods and services sector accounts

HANDBOOK

2016 edition



Environmental goods and
services sector accounts
MANUAL | **2016 edition**

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Preface

I am pleased to present this new handbook on environmental goods and services sector accounts, replacing the 2009 edition (Eurostat, 2009).

Environmental goods and services sector accounts report data on national economy production activities that generate environmental products. The accounts facilitate monitoring progress in implementation of the Union's policy priorities on environmental protection, resource management and green growth. They measure production of environmental goods and services and of related employment in a way that is compatible with the international UN System of National Accounts (SNA 2008), its European version the European System of Accounts (ESA 2010) and the System of Economic-Environmental Accounting Central Framework (SEEA-CF 2012). As a consequence, the data are expected to satisfy the needs of both macroeconomic users and environmental experts.

The present handbook responds to the need to produce and compile comparable statistics on the environmental goods and services sector as required by Regulation (EU) No 691/2011, and voluntary extensions agreed by the European Statistical System. The primary purpose of the handbook is 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. This handbook was written by

This volume is accompanied by the *EGSS Practical Guide, 2016 edition*. The *EGSS Practical Guide* explains in more detail methods to compile the environmental goods and services sector accounts, in particular top-down techniques, which are only sketched in Chapter 4 of this volume.

Finally, whereas the handbook is primarily addressed to producers of environmental goods and services sector accounts, it can also be a reference for advanced users.

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 Environmental Expenditure Statistics.

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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
CIF:	cost – insurance - freight
CN:	Combined Nomenclature
COFOG:	Classification of the Functions of Government
CPA:	Statistical Classification of Products by Activity
CReMA:	Classification of Resource Management Activities
EBOPS:	Extended Balance of Payments Services
EGS:	Environmental Goods and Services
EGSS:	Environmental Goods and Services Sector
EP:	Environmental Protection
EPEA:	Environmental Protection Expenditure Accounts
EPS:	Environmental Protection Services
ESA 2010:	European System of Accounts (2010)
ESS:	European Statistical System
EU:	European Union
FOB:	free on board
FSC:	Forest Stewardship Council
FTE:	full-time equivalents
GDP:	Gross Domestic Product
GVA:	Gross Value Added
HS:	Harmonised Commodity Description and Coding System
IEEAF:	Integrated Environmental and Economic Accounting for Forests
ISIC:	International Standard Industrial Classification
LFS:	Labour Force Survey
LKAU:	Local Kind of Activity Unit
Mio EUR:	million euro
NA:	National Accounts
NACE:	Statistical Classification of Economic Activities in the European Community
OECD:	Organisation for Economic Cooperation and Development
PRODCOM:	Statistics on the Production of Manufactured Goods in the European Community
RAMON:	Reference and Management of Nomenclatures database
ReMEA:	Resource Management Expenditure Accounts
RM:	Resource Management
R&D:	Research and Development
SBS:	Structural Business Statistics
SEEA:	System of Environmental-Economic Accounting

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

SITC: Standard International Trade Classification

SNA: System of National Accounts

UN: United Nations

VAT: Value added tax

WTO: World Trade Organisation

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1

Introduction

The environmental goods and services sector is sometimes called 'eco-industries' or 'environmental industry'. The 'Employment Package' launched in April 2012 identified the "green economy" as a key source of job creation in Europe.⁽¹⁾ The EGSS domain of the European Statistical System is the ideal framework to collect data on employment that directly depends on the production of outputs intended to protect the environment and to manage natural resources. Due to its compatibility with the boundaries and definitions used in the national accounts the EGSS database is an indispensable input to microeconomic and macroeconomic analysis of the green economy, environmental and resource policy analysis and the monitoring of policy targets. For most of the countries the EGSS is important for analysing issues related to green growth and green employment. The main demands for EGSS data come from various Commission Directorates General and international organisations, national governments (e.g. ministries of environment, finance and economy), but also from business associations, workers' unions, environmental protection agencies, non-profit organisations and the research community.

CONCEPTUAL FRAMEWORKS FOR ENVIRONMENTAL GOODS AND SERVICES

The environmental goods and services sector (EGSS) comprises all entities in their capacity as 'environmental producers', i.e., undertaking the economic activities that result in products for environmental protection and resource management. Producers in the EGSS may or may not be specialised in the production of environmental goods and services, and may produce them as principal or secondary activities or produce these products for own use. Consequently, the scope of the EGSS may only overlap with existing legal definitions or statistical classifications of units only to a certain extent.

Environmental goods and services sector accounts are part of environmental accounts. Environmental accounts are a multipurpose data system defined in the System of Environmental-Economic Accounting 2012 - Central Framework (SEEA-CF 2012, United Nations et al., 2014a). Environmental accounts encompass a conceptual framework and tables which describe the interrelations between the economy and the environment in a way that is consistent with the System of National Accounts (SNA 2008, United Nations et al., 2009, chapter 29) and in the European System of Accounts (ESA 2010, Eurostat, 2013, chapter 22). Environmental accounts provide information related to a broad spectrum of environmental and

⁽¹⁾ This Employment package is a set of policy documents looking into how EU employment policies intersect with a number of other policy areas in support of smart, sustainable and inclusive growth

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.

The SEEA-CF 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 be coherent when integrating environmental and economic statistics. This allows comparing the results of the environmental-economic accounts with the aggregates of the national accounts.

The SEEA-CF section 4.3 titled *Environmental activity accounts and statistics* describes the purpose, scope and definition of the EGSS and other monetary environmental accounts. The EGSS accounts provide information on the production of environmental goods, services and technologies and statistical data on the contribution of this production within the economy as a whole. They also quantify related employment, gross value added and exports from the sector.

EUROPEAN STRATEGY FOR ENVIRONMENTAL ACCOUNTS AND LEGAL BASIS

In order to respond to the growing needs of information in the environmental-economic sphere 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 ESEA currently in force covers the period 2014-2018 ⁽²⁾ and 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 adopting in 2011 a legal basis setting out a common framework for the collection, compilation, transmission and evaluation of European environmental-economic accounts (Regulation (EU) No 691/2011⁽³⁾). The Regulation stipulated mandatory reporting of three modules: air emissions accounts, environmental taxes and economy-wide material flow accounts.

Regulation (EU) No 691/2011 also requests the Commission to draw up pilot study programmes to test the feasibility of the introduction of new environmental-economic accounts modules, including the EGSS accounts. A first pilot data collection was launched in 2009 followed by voluntary data collections in subsequent years. By 2014 the underlying conceptual framework and compilation methods had advanced to the point that the European Parliament and the Council agreed to include the EGSS accounts in the legal basis (Regulation (EU) No 538/2014⁽⁴⁾ amending Regulation (EU) No 691/2011).⁽⁵⁾

The scope of the mandatory reporting of the EGSS data is laid down in Annex V of Regulation (EU) No 691/2011. The EU Member States are requested to submit to Eurostat on an annual basis data on output, exports, gross value added and employment corresponding to market activities cross-classified by economic activities (NACE Rev. 2 A*21) and classes of the Classifications of Environmental Protection Activities (CEPA) and Resource Management Activities (CReMA). Besides the mandatory characteristics included in Annex V, the working group on environmental expenditure statistics identified other characteristics relevant for voluntary reporting, in particular output, gross value added and employment related to non-market activities, own final use and ancillary activities.

As provided for under article 3.5 of Regulation (EU) No 691/2011 an indicative compendium of environmental goods and services and of the economic activities was established to facilitate a uniform delineation of environmental activities across the EU Member States. This list, comprising 46 groups of products and 46 groups of activities, was defined in the Annex of Commission Implementing Regulation (EU) No 2015/2174.⁽⁶⁾ Furthermore, the Implementing Regulation also states that the activities and products to be covered by EGSS accounts should be nationally relevant. As some activities and products may not exist or may not be statistically significant in some countries or as data sources for their estimation may be missing, the indicative compendium does not impose a mandatory list of activities and products on

⁽²⁾ European Statistical System Committee (2014)

⁽³⁾ Regulation (EU) No 691/2011 of the European Parliament and of the Council of 6 July 2011 on European environmental economic accounts

⁽⁴⁾ 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

⁽⁵⁾ In total three modules were added in 2014: environmental protection expenditure accounts (EPEA), EGSS accounts and physical energy activity accounts

⁽⁶⁾ Commission Implementing Regulation (EU) 2015/2174 of 24 November 2015 on the indicative compendium of environmental goods and services, the format for data transmission for European environmental economic accounts and modalities, structure and periodicity of the quality reports pursuant to Regulation (EU) No 691/2011 of the European Parliament and of the Council on European environmental economic accounts

which countries should report the characteristics asked for.

EGSS AS PART OF AN INTEGRATED FRAMEWORK OF MONETARY ENVIRONMENTAL ACCOUNTS

Whereas the EGSS accounts are a standalone statistical product, they are also part of the set of monetary environmental accounts following the SEEA-CF framework. Some of those accounts are covered in Regulation (EU) No 691/2011, namely: EGSS, environmental taxes and environmental protection expenditure accounts (EPEA); others are not, namely: environmental subsidies (under development) and resource management expenditure accounts (ReMEA; under development and no European data collection yet).

One of the conceptual strengths of the SEEA-CF is internal coherence. In the case of the monetary accounts, integration is not perfect however. This is partly due to a legacy of historical development and different terminology. The Working Group on environmental expenditure statistics discussed in 2014 and 2015 how to further integrate the monetary modules. There are country projects on this matter. This line of work has taken momentum and it is part of the SEEA research agenda, but it is not finalised yet. This EGSS handbook and other upcoming Eurostat handbooks on EPEA and ReMEA reflect the state of the art, in particular with a unified terminology, conceptual links across the accounts and using some accounts as data sources for others. Annex 9 develops this point.

PURPOSE AND STRUCTURE OF THE MANUAL

This handbook provides guidance on the scope, concepts and data compilation methods of the EGSS accounts for environmental activities undertaken by market producers (in the context of implementation of reporting requirements stipulated in Annex V of Regulation (EU) No 691/2011), and by non-market and ancillary producers as well as by producers for own final use (voluntary data collection).

The primary purpose of the guidelines is to support the data compilers in the process of the data's collection, compilation and reporting to Eurostat. The Manual updates and replaces the guidance contained in the 2009 edition of "The environmental goods and services sector – a data collection handbook" (Eurostat, 2009).

The revision was necessary for several reasons:

- First, the release of a new version of the European System of Accounts (ESA 2010) and of the System of Environmental-Economic Accounts - Central Framework (SEEA-CF 2012);
- Secondly, the amendment of Regulation (EU) No 691/2011 establishing an obligation to compile and transmit to Eurostat data on EGSS;
- Thirdly, lessons learnt from recent developments and experience gained in methodological discussions and implementation projects. Since 2009, the national statistical institutes and Eurostat have devoted efforts to identify reliable sources and establish efficient procedures for the compilation of EGSS data. Some of the actions aiming to set-up, complete and improve the monetary environmental accounts were co-financed by the Commission with grants and resulted in reports shared with the statistical community.⁽⁷⁾ Based on the experience gained, Eurostat has also prepared the *EGSS Practical Guide, 2016 edition* (Eurostat 2016), presenting in detail methods to compile the EGSS accounts using as inputs aggregated data readily available.
- Finally, further development work on other monetary environmental accounts, in particular establishment of the legal basis for environmental protection expenditure accounts (EPEA) and all the methodological that led to it, the resource management expenditure accounts (ReMEA) by Eurostat Task Forces and Working Groups, and the work on *Integrating the monetary environmental accounts* (Eurostat, 2015b) aimed at unifying concepts and terminology used in various sets of monetary environmental accounts.

This handbook aims to facilitate the production of harmonised and comparable data across time and countries. It provides an overview of the concepts underlying the data compilation (definitions, scope delimitations and classifications, Chapter 2), presents the framework for data collection in accordance with the requirements of Regulation (EU) No 691/2011 (Chapter 3), elaborates on methods for data collection and compilation (Chapter 4) and suggests how to present and interpret the EGSS data (Chapter 5).

⁽⁷⁾ A catalogue of pilot study reports with links to final reports is available: <http://ec.europa.eu/eurostat/web/environment/overview>

2

Definitions, delimitations and classifications

This chapter presents the basic definitions of environmental activities and environmental goods and services. It then addresses the scope of the EGSS in terms of products and activities. Subsequently, key categories of environmental products are briefly described and scope exclusions and inclusions are outlined. The chapter continues by recalling statistical definitions of units relevant to the compilation of EGSS accounts. Finally it presents classifications to compile and report EGSS accounts.

2.1. Environmental activities and products

The environmental goods and services sector is a sub-set of the whole economy. Defining the scope of the EGSS in a sufficiently accurate way for statistical measurement is not straightforward. The issue is where to draw the borderline of the sector, and how to do it in a way that is conceptually relevant, statistically sound and aligned in practice to the (definitions and classifications used in the) data sources available for the compilation of the accounts. There is also the issue how to define the scope of the EGSS in a harmonised way ensuring international comparability while allowing some flexibility for very specific national circumstances.

The environmental goods and services *sector* is constituted by a group of economic entities or units. Because the EGSS accounts are focused on supply (production, value added, employment, exports), those economic units will be producers. This leads us to the notion of environmental producers, who are producers engaged in environmental activities. The output of those activities are environmental products. One technical issue is whether to define the EGSS scope around environmental producers, environmental activities or environmental products (i.e., as in 'which economic producers constitute the EGSS?' or rather 'which production activities belong to the EGSS?' or 'which products (i.e. goods and services) are part of the sector?'). Whereas environmental 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 focus only on two of those approaches: activities and products. SEEA-CF conceptually starts from environmental activities and builds from there. An approach turning around environmental products may be useful in particular in countries using a product-based compilation approach.

Whether setting the EGSS scope in terms of producers, products or activities, in practice EGSS compilers must be aware that environmental producers may also be engaged in secondary activities of non-environmental products, which means secondary non-environmental production which must be taken out from the EGSS estimates. Thus EGSS compilers must be careful to properly exclude secondary non-environmental activities and products. This topic will appear again in section 2.3 about statistical units and in Chapter 4 about compilation.

This handbook addresses the definition of the scope of EGSS with an approach based on three layers. The first layer is the SEEA-CF, which provides the fundamental definitions, and is a worldwide standard. This concerns in particular the SEEA-CF definitions of environmental activities, environmental protection and resource management. The second layer, which is relevant EU-wide, consists of lists of environmental activities and products consistent with the SEEA-CF definitions. Those lists are more operational for the compilation of the accounts, in the sense that they link to statistical classifications and data sources. The third layer consists of (possible) national lists of environmental activities and products. National lists may be necessary if there is a need, under specific circumstances, to adjust the EU lists for national purposes. This set-up is explained in this section.

WHAT ARE ENVIRONMENTAL ACTIVITIES AND ENVIRONMENTAL PRODUCTS?

The SEEA-CF, Chapter 4 provides the basic definitions for environmental activities that are relevant for EGSS. Accordingly, environmental activities encompass those economic activities whose primary purpose is to reduce or eliminate pressures on the environment or to make more efficient use of natural resources.

In that definition, 'economic activity' must be understood in the sense of national accounts. According to ESA 2010, § 2.145 an activity occurs when resources are combined, leading to the creation of specific goods or services. An activity is characterised by an input of products, a production process and an output of products, whereby production is an activity carried out under the control, responsibility and management of an institutional unit that uses inputs of labour, capital and goods and services to produce outputs of goods and services (ESA 2010, § 3.07).

This handbook defines *environmental activities* as activities that either directly serve an environmental purpose or produce specifically designed products whose use serve an environmental purpose. Environmental activities can be performed as principal, secondary or ancillary activities of a producer.

Environmental activities can be classified by their purpose. Regulation (EU) No 691/2011 distinguishes two broad types of environmental activities, in line with the SEEA-CF, according to their purpose:

- Environmental protection (EP) activities include 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, and
- Resource Management (RM) activities include the preservation, maintenance and enhancement of the stock of natural resources and therefore the safeguarding of those resources against depletion.

Indeed the concept of environmental activities, which was introduced above, can be reformulated in terms of activities with EP or RM purpose. This definition emphasises the EP or RM purpose of an environmental activity or the purpose of the product produced as result of that activity. Experience over the years has shown that several interpretations of the concept of 'environmental purpose' may exist. The box below further develops this argument.

The definition of environmental products derives from environmental activities. Environmental products are the outputs of environmental activities. In line with the definition of environmental activities, environmental products are all products that directly serve EP or RM or are specifically designed products whose use serves for EP or RM.⁽⁸⁾ Environmental products can be produced as principal, secondary or ancillary output of a producer. If a producer engaged in environmental activities also has non-environmental activities the output of the non-environmental activities are not EP or RM products.

Box 1: Environmental purpose

The environmental purpose criterion has a central function to the proper delimitation of the scope of the EGSS. To identify environmental 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

⁽⁸⁾ See also SEEA-CF 2012, paragraph 4.95

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 actual leading motivation or objective of actors;
- purpose laid down in legislation;
- purpose based on revealed intentions, i.e. policy statements or declarations of respondents.

Actual leading motivation and revealed intentions may be difficult to observe or measure. More importantly, for the EGSS accounts it is less relevant to identify whether an activity has a primary environmental purpose or not as EGSS also comprise activities that produce products that have EP or RM as their secondary purpose (e.g. manufacturing of cars with zero emissions and the generation of electricity from renewable sources). Therefore, in practice, an environmental purpose may be also identified through the following criteria:

- technical nature, i.e. inputs, a production process and outputs 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 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 or through the reduction of the use of natural resources, whatever the stated motivations and presumed or real effects are.

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

From a statistical point of view, the focus on the technical aspects is the most neutral basis for determining the environmental purpose. In fact it allows checking the purpose of production activities by considering the suitability from a technical perspective of various goods and services for achieving the environmental purpose, whatever the motivation of the agent that produces it.

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

Although the technical nature criterion helps to identify an activity or a product as environmental, it is not sufficient to characterise some products and activities as environmental or not. For this reason there is need for an indicative compendium of environmental activities and products.

OPERATIONALISING THE SCOPE OF EGSS: THE INDICATIVE COMPENDIUM

Whereas the SEEA-CF and Regulation (EU) No 691/2011 provide definitions for EP and RM activities and products, in practice they rely on a measurement approach based on purpose (of the producing activity and use of the products). Depending on the sources used for the compilation of EGSS accounts it may be rather difficult to interpret the SEEA-CF definitions, i.e. to decide if a certain economic activity belongs into the scope of EGSS. To ensure that compilers of EGSS working independently, e.g. in different countries, apply the definitions in identical ways it is important to make the definitions operational. This can be done with lists of environmental activities and products.

The European Commission has established by means of an implementing act⁽⁹⁾ an indicative compendium of environmental goods and services and of the economic activities to be covered by the EGSS accounts to

⁽⁹⁾ Commission Implementing Regulation (EU) No 2015/2174 of 24 November 2015 on the indicative compendium of environmental goods and services, the format for data transmission for European environmental economic accounts and modalities, structure and periodicity of the quality reports pursuant to Regulation (EU) No 691/2011 of the European Parliament and of the Council on European environmental economic accounts, http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2015.307.01.0017.01.ENG

facilitate a uniform application of Annex V of Regulation (EU) No 691/2011. Annex 1 of this handbook reproduces the environmental products and activities according to this indicative compendium.

The definition of environmental activities in the SEEA-CF and the lists of EGSS products and activities in the indicative compendium complement each other. The SEEA-CF provides the conceptual foundations for the scope of the accounts. The indicative compendium provides a practical list of activities and products that can be identified from classifications and data sources. The SEEA-CF definition justifies the inclusion or exclusion of activities and products in the indicative compendium.

Whereas the compendium must operationalise the scope of the EGSS, it does not impose any specific compilation approach to the countries (activity based, product based or a mix of approaches; for detail see Chapter 4). It allows flexibility to take account of specific national situations as regards their economies and data availability. Regulation (EU) No 691/2011 recognises it with the wording *indicative compendium*. For this reason, the lists of activities and products in the indicative compendium are the core products/activities found relevant for EGSS accounts and important in most of the European countries. Countries must use either the list of environmental activities or environmental products or both, depending on whether their compilation approach is activity-based or product-based or mixed.

In order to facilitate the use of the indicative compendium Eurostat maintains operational EGSS lists of activities and products.⁽¹⁰⁾ Those lists do not have a legal basis. They include correspondence with standard classifications, as follows:

- The operational list of EGSS activities (see an excerpt in Annex 2) reproduces in its first column the environmental activities from the compendium. The next three columns of the operational list refer to the NACE classification of economic activities. They indicate the NACE categories (up to the 4-digit class level) relevant for the identification of the environmental activities. There is mostly no strict 1:1 correspondence between them because more than one NACE category may be relevant for one item of the compendium and only in a few cases it may be assumed that an identified NACE category is entirely environmental. Therefore the operational list also indicates whether the identified NACE codes 100% represent an environmental activity or only partially do so. In the latter case normally only a certain percentage of the identified activity may be considered as environmental. This percentage may differ across countries. Concrete examples of activities which may have different relevance at national level are found in section 4.1.1;
- The operational list of EGSS products (which has a layout similar to that of the operational list of EGSS activities) reproduces in its first column the environmental goods and services from the compendium. The next six columns of the operational list refer to the CPA and CN classifications. They propose CPA categories (up to the 6-digit level) and CN categories (up to the 8-digit level) relevant for the identification of the environmental products. There is mostly no strict 1:1 correspondence between them because more than one CPA or CN category may be relevant for one item of the compendium and only in a few cases it may be assumed that an identified CPA or CN category is entirely environmental. Therefore the operational list also indicates whether the identified CPA and CN codes 100% represent an environmental product or only partially do so. In the latter case normally only a certain percentage of the characteristic (e.g. output, exports) of the identified product may be considered as environmental. This percentage may differ across countries. Concrete examples of products which may have different relevance at national level are found in section 4.1.1;
- Both operational lists also indicate the classes of environmental activities into which the items in the compendium can be classified (for more detail on the CEPA and CReMA classifications see section 2.4). A specific item in the compendium may relate to more than one for the classes of environmental activities. E.g. training services in environmental protection and resource management can in principle relate to any of the classes of CEPA or CReMA. In such cases compilers need to find a distribution key or allocate the item to one environmental class presumed dominant.

National EGSS compilers are given flexibility to take account of the activities and products with national relevance. Countries can limit themselves to the compendium products and activities that are nationally relevant. National compilers can also take into account some environmental activities and products not listed in the compendium but relevant in their country. However in order not to threaten the comparability of EGSS data between countries such inclusion is only accepted if these activities and products are deemed to be country specific, i.e. have no statistical relevance for other countries.

⁽¹⁰⁾ See document ENV/ACC/WG04.3 presented at the meeting of the Working Group Environmental Expenditure Accounts of 12 and 13 April 2016

Countries must inform the European Commission (Eurostat) about deviations between national lists and the lists in the indicative compendium. Countries must also justify those deviations and verify periodically that they are still applicable. The intention is that this is reported periodically, say every 5 years, as part of the EGSS quality reports. This process may lead to a revision of the compendium in future.

In any case it can be helpful for national compilers of EGSS accounts to compile their own country specific operational lists with the indicative compendium and Eurostat's operational lists as starting points.

PRODUCT CATEGORIES FOR REPORTING TO EUROSTAT

Regulation (EU) No 691/2011 states that environmental goods and services fall within the categories of: environmental specific services, environmental sole purpose products (connected products), adapted goods and environmental technologies. SEEA-CF 2012 provides definitions of EP specific services (§ 4.53), EP connected products⁽¹¹⁾ (§ 4.65), adapted goods (§ 4.99) and environmental technologies (§ 4.103).

The Regulation does not require that countries report the EGSS characteristics broken down by those product categories. Moreover, those categories are very difficult to handle. The data sources do not use the same concepts. In particular environmental technologies have no direct correspondence in the product categories in national accounts (ESA 2010). Technology is not a category of products identifiable in national accounts and can therefore be followed only with difficulty by standard economic statistics (e.g., those using the NACE or CPA classifications). Moreover, the categories are based on concepts defined differently in the various monetary environmental accounts.

Therefore, this handbook proposes a simpler categorisation of products. Environmental products can be categorised by whether they serve primarily EP or RM purposes or whether they serve primarily a non-environmental purpose but may serve a secondary environmental purpose because they are specifically designed to be more environmentally friendly or more resource efficient than normal products of equivalent use. The first group may be called 'primary purpose environmental products' and the second group of products 'secondary purpose environmental products'.

This leads to two broad categories of products, as follows:

- *Environmental specific products* primarily serve environmental protection or resource management. Examples are sewerage services and collection, treatment and disposal services for waste, sound or thermal insulation materials, equipment for renewable energy production. *Environmental specific products* are divided into two subsets: *environmental specific services* is the subset covering only those environmental specific products that are services and *environmental specific goods* is the subset covering those environmental specific products that are goods (see Box 2 below about the distinction between goods and services);
- *Cleaner and resource efficient products* primarily serve a non-environmental purpose but may serve a secondary environmental purpose because they are specifically designed to be more environmentally friendly or more resource efficient than normal products of equivalent use. Secondary purpose should not be mistaken with secondary product, which is the output of a producer's secondary activity (ESA 2010, § 3.11). Examples of cleaner and resource efficient products are electric transport equipment, secondary raw materials, electricity, fuels, gas and heat from renewable sources, the most resource efficient domestic appliances. It is worth noting that secondary purpose should not be mistaken with secondary product, which is the output of a producer's secondary activity (ESA 2010, § 3.11).

Eurostat asks countries to report in the questionnaire (on a voluntary basis) *environmental specific services* and *cleaner and resource efficient products* as 'of which' positions of market output (see section 3.1.1). The Regulation's product categories can be mapped into these two broad categories of products as follows:

Environmental specific products:

- environmental specific services,
- connected products,
- most environmental technologies.

Cleaner and resource efficient products:

- adapted goods,

⁽¹¹⁾ 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. In the EGSS accounts connected products may also serve RM purposes

- some environmental technologies.⁽¹²⁾

Box 2: Features of goods and services

Characteristics of goods are that they:

- are physical objects,
- can be traded separately from their production.

Characteristics of services are that they:

- are not physical objects,
- cannot be traded separately from their production.

This handbook adopts the delimitation between goods and services of the Balance of Payments. 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). Services correspond to products described at international level by the Extended Balance of Payments Services (EBOPS) classification. Annex 7 presents examples from the classification of services used for EBOPS that are relevant for identifying environmental services and the correspondence with the Statistical Classification of Products by Activity in the European Union (CPA 2008).

Cleaner and resource efficient products may or may not be easily identifiable. Environmental labelling schemes and standards can help identifying environmental products (see Box 3). This handbook proposes that countries select products that have the highest environmental class given by European schemes. Other guidance to identify cleaner and resource efficient products is provided in Chapter 4, e.g. Box 7.

Box 3: Examples of labels and standards useful for identifying environmental products

Energy efficiency

EU Directive 92/75/EC (replaced by Directive 2010/30/EU) established an energy consumption labelling scheme. The directive was implemented by several other directives. Most white goods, light bulb packaging and cars must have an EU Energy Label clearly displayed when offered for sale or rent. The energy efficiency of the appliance is rated in terms of a set of energy efficiency classes from A to G on the label, A being the most energy efficient, G the least efficient. The information should also be given in catalogues and included by internet retailers on their websites.

In an attempt to keep up with advances in energy efficiency, A+, A++ and A+++ grades were later introduced for various products; since 2010, a new type of label exists that makes use of pictograms rather than words, to allow manufacturers to use a single label for products sold in different countries.

Energy efficient products can be found in any NACE category producing electrical or heating equipment. Identification of energy efficient products for inclusion in EGSS can be very time-consuming if it must be done case by case. Some countries use as a proxy the criterion of products with a significantly different technology that does not change on a yearly basis.

Organic farming

Council Regulation (EC) No 834/2007 on organic production and labelling of organic products defines and sets the conditions for organic production. Organic farming differs from other agricultural production methods in the application of regulated standards (production rules), compulsory control schemes and a specific labelling scheme. For farming to be included under organic farming the production methods must be compliant with the rules established by this Regulation.

The products of organic farming (including organic plant, livestock and aquaculture production) are

⁽¹²⁾ Mainly equipment whose use in production processes is less polluting and resource intensive than the use of equivalent normal technology. Such equipment is also called 'integrated technologies'. We may often consider that technologies for ancillary environmental activities can be such integrated technologies

considered in this handbook as cleaner and resource efficient products.

Organic farming is part of NACE 01. The processing of organic farming products (NACE 10-12; manufacture of food products, beverages and tobacco products) is, however, not considered in this handbook to be an environmental activity and the resulting products are not environmental products.

Sustainable forestry

According to the EU Forest Strategy (COM (2013) 659 final, sustainable forest management means 'using forests and forest land in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems'. The implementation of the EU forest strategy builds on existing legislation and international initiatives, on work carried out under Forest Europe and also on the special situation of small forest owners. Certification issues as market-based private-sector tools are also included there.

According to the indicative compendium forestry products included in EGSS reporting to Eurostat as cleaner and resource efficient products are fuel wood, and other wood when complying with sustainability measures i.e. with e.g. Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC) standards. Afforestation, reforestation and the protection of forests against forest fires and pests are included as specific RM products.

Sustainable forestry is part of NACE 02.

Other environmental labels

Another way to identify cleaner and resource efficient products is to rely upon the existing 'eco-labels'. Goods which comply with the standards set by an eco-label or which fall within the top class of an eco-label may be included in the list. The advantage of such a rule-of-thumb is its user-friendliness. The disadvantage is that, for certain goods, standards set by eco-labels are too broad, allowing for the incorporation of most of the production of a good and thus not allowing for the identification of leading 'green' goods. Moreover eco-labels may vary across countries and hamper comparisons.

Difficulties can arise in the classification of these goods since the eco-labels take into consideration several environmental concerns. The detailed specifications of each eco-label can give information on the main environmental concern that is addressed by the labelling scheme.

2.2. EGSS borderline cases

Distribution of environmental products

According to this handbook, wholesale trade and retailing of environmental products are not part of the EGSS. The rationale is that in general the distribution of environmental products is not specifically designed to serve an EP and RM purpose. Because it includes collection and sorting wholesale in waste and scrap (NACE 46.77) is often seen as having a link in the production chain of waste management since it brings together supply and demand for waste and scrap. However wholesale in waste and scrap was not retained in the indicative compendium and is therefore excluded from reporting in this handbook.

Public transport, equipment and installations for public transport

Insofar as it replaces individual transport by car, public transport contribute to protect the environmental and safeguard natural resources; however it is not considered an environmental activity as such.⁽¹³⁾ As a consequence, equipment and infrastructure for public transport are also excluded, except when they are specifically designed to substitute more polluting equipment (e.g. electric buses reducing the risk of city smog compared to buses with diesel engines).

Inclusion or exclusion of upstream and downstream activities

Some clarification is needed as to which upstream activities to and downstream activities from EGSS are included in or excluded from the EGSS accounts. In this handbook an upstream activity designates the production of a good or service that is used as an input in the production of an environmental product. Correspondingly, a downstream activity is the production of a good or service that uses an environmental

⁽¹³⁾ Countries may record their production as peripheral environmental activities outside the EGSS scope for national purposes

product as input in further production activities.

The question of whether upstream or downstream activities are recorded in EGSS accounts may appear when analysing in detail the production structure of certain activities to estimate their contribution to EGSS.

The general principle for recording upstream and downstream activities in EGSS accounts is that the activities must meet the definition of environmental activities, i.e. that they either directly serve an environmental purpose or produce specifically designed products whose use serve an environmental purpose. This condition is valid for activities whose output is used for intermediate consumption and for gross fixed capital formation. It is the technical nature of the good or service produced in the upstream or downstream activity (i.e. whether the product is suitable to reduce the pressure on the environment) that determines whether the upstream or downstream activity is an environmental activity or not.

Upstream products (i.e. the output of upstream activities) are generally identified through a chain-of-value analysis of the manufacturing process, e.g., a photovoltaic panel is an environmental product composed of photovoltaic cells, whereby the production of photovoltaic cells necessitates silicon wafers, ingots etc.

System components of environmental goods (e.g. slewing rings for wind turbines, solar collectors for solar water heaters, heat exchangers as part of condensing boilers, inverters for photovoltaic systems, etc.) are also environmental goods if they have been specifically designed and produced for the purpose of EP or RM. However, the sources available may not allow distinguishing which components of a final environmental product have been specifically designed and produced for EP or RM. In this case, in particular to facilitate the use of demand side data (e.g. investment data) in the compilation of EGSS accounts, it may be acceptable to include the production of all components.

Installation services for environmental goods (e.g. for solar panels, wastewater pipes and thermal insulation materials), construction activities for energetic refurbishment of existing buildings and the construction of low energy and passive buildings are considered as environmental services. They should be part of EGSS irrespective of whether the establishments are doing it as primary or secondary activities.

The criterion that environmental products must be designed and produced for EP or RM purposes excludes many downstream activities that use outputs of environmental activities as raw materials. Although CReMA may be interpreted as including these activities, in this manual, following the indicative compendium products manufactured from recovered materials (e.g. paper made from recovered paper or steel made from recovered scrap) are not included in EGSS. The rationale is that paper and steel produced from recovered materials do not reduce as such the use of natural resources any more than the reduction already achieved due to the recovery of the paper and scrap. It is rather the recovery of the materials (production of secondary raw materials) that reduces the use of natural resources.

Environmentally friendly production of a non-environmental product

Environmental services can be produced for own use of a producer to avoid or reduce environmental damage and resource depletion which would result from the production of non-environmental products. The in-house production of environmental services are ancillary activities within the scope of EGSS, whereas the production of non-environmental products does not fall within the scope of EGSS, even when there are in-house measures (ancillary activities) that avoid or reduce its environmental impacts (the cleaner and resource efficient products as defined in section 2.1 are included in EGSS). For example, the production of a good is not automatically considered as an environmental activity only because the producer treats own industrial waste to become less toxic. Analogously, a good is not automatically an environmental product only because the producer carries out an ancillary environmental activity.

Also the use of environmental products as intermediate consumption for other production is not sufficient for this other production to be considered as an environmental activity or for its output to be considered as environmental products. For example, a product packaged with biodegradable plastics or a cleaning service using particularly environmentally friendly detergents are not automatically environmental products.

Environmentally related activities, non-produced assets and ecosystem services

A distinction is drawn between environmental activities and environmentally related activities which are other economic activities closely associated with the environment or using the environment directly in their production processes. For example, services of extraction of mineral and fossil resources and services of collection, treatment and distribution of drinking water are excluded from the scope of the EGSS.⁽¹⁴⁾

⁽¹⁴⁾ In the compilation practice data sources may not always allow drawing a clear delimitation between RM services aiming at reducing the depletion of natural water resources and those activities that supply drinking water

Environmentally related activities are excluded from the scope of environmental activities. Their respective outputs (products) are not environmental products. Generally excluded from the scope of environmental products are all assets and activities that are not the result of an economic activity such as *non-produced assets* (e.g. natural water) and ecosystem services.⁽¹⁵⁾

Other protection activities

Also excluded from EGSS are products which may have a positive impact on the environment but which are produced for health and safety at the work place, e.g. to protect *workers* (e.g. against exposure to pollutants and noise), protect establishments against *natural hazards and effects of climate change* (e.g. floods, landslides, volcanic eruptions, tempests), and against *technological hazards* (e.g. external safety of industrial establishments). Also cleaning services for *specific technical purposes* (e.g. purification of water or air for specific industrial processes; clean rooms) are excluded.⁽¹⁶⁾

2.3. Statistical units

The question of the statistical units for EGSS accounts is relevant in several ways, with both conceptual and practical implications.

Regulation (EU) No 691/2011 stipulates that statistics on environmental goods and services record and present data on national economy production activities that generate environmental products in a way that is compatible with the data reported under ESA. EGSS accounts use statistical units from national accounts. National accounts define and use various statistical units and groupings of units that interact economically (ESA 2010, §§ 1.54-1.56, 2.01-2.03).

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). Institutional units are grouped into institutional sectors. The institutional sectors in national accounts are non-financial and financial corporations, general government, households, non-profit institutions serving households, and the rest of the world.

For the purpose of analysing economic production, national accounts suggest to decompose institutional units into smaller and more homogenous units with regard to the kind of production. These units are called local kind-of-activity units – LKAU (ESA 2010, §§ 1.58, 2.144-2.149). A LKAU may correspond to an institutional unit as producer; on the other hand, it can never belong to two different institutional units. Note that LKAUs do not necessarily have decision-making autonomy when they are part of a larger institutional unit.

Because the EGSS characteristics (output, gross value added, employment, exports) all relate directly to production activities and Regulation (EU) No 691/2011 stipulates recording activities in a way that is compatible with ESA, the LKAU (or establishment⁽¹⁷⁾) is the preferred statistical unit to be used for EGSS accounts. LKAUs are generally more homogenous than institutional units in terms of production which makes the identification of their environmental activities and output easier. Compiling EGSS accounts at LKAU level requires that the institutional unit's information system allows identifying or calculating for each LKAU the economic characteristics studied.

If an institutional unit producing goods or services contains a principal activity and also one or several secondary activities, it is subdivided into the same number of LKAUs, and the secondary activities are classified under different headings from the principal activity. The ancillary activities are not separated from the principal or secondary activities. However, if the accounting documents do not allow such detail the compilers are not able to decompose institutional units into as many homogenous LKAUs each one undertaking only one activity.

Ideally, it is recommended that EGSS uses the same units as the (monetary) supply-use tables of the national accounts. Normally this is LKAU but it may differ from country to country. However, in practice, EGSS compilers use different national sources, which come with their own units, and the (units underlying

⁽¹⁵⁾ "Ecosystem services" is a term used to describe the contributions of ecosystems to benefits used in economic and other human activity (e.g. carbon sequestration and recreational opportunities) (see United Nations et al., 2014b, p. 18)

⁽¹⁶⁾ However, if goods and services that mainly serve such human, economic and technical purposes or aim at minimising natural hazards and the impacts of climate change are used also for environmental purposes according to data on environmental expenditure they may be considered as in the scope of EGSS to facilitate the use of demand side data in the compilation of EGSS accounts

⁽¹⁷⁾ What ESA 2010 calls "LKAU" SNA 2008 calls "establishment" (ESA 2010, § 2.148)

the) result of this combination process may be uncertain.

This framework has implications for EGSS compilers. The main one is that EGSS compilers must be aware of the different units underlying the national sources for EGSS. National compilers combine different sources and thus units. This is particularly important as regards the secondary activities. Countries using LKAU-based sources can expect to need less reallocation of secondary activities, and in some cases can assume secondary activities to be zero. Other implications are for instance:

- **Relation producers – activity (conceptual).** An institutional unit may be engaged in different types of production, in different activities. Also a LKAU may be engaged in different activities. Secondary activities are expected to be smaller in LKAUs than in institutional units. The secondary activities may have a different nature than the principal one, e.g. may be in a different NACE code, may be non-environmental activities, etc.

Therefore, environmental producers may also be engaged in secondary non-environmental activities and produce non-environmental products. Those must not be included in EGSS. Chapters 3 and 4 elaborate on this point.

- **Meaning of industries:** NACE is a classification of activities (see section 2.3) used also to classify individual producers by their main activity. Moreover, in accounting it is mostly used to present together the data for a group of producers having the same principal activity (i.e., industries). From a presentational viewpoint, such aggregated data reported under a given NACE category, e.g. in EGSS or in a supply-use table, may include secondary activities of those producers.
- **Relation producers – activity (in the compilation process).** A compilation procedure to identify the population of EGSS producers, on the basis of environmental activities and/ environmental products, is explained in section 4.1.1. This process may require different treatment of secondary production depending on whether the population in the source used LKAUs or institutional units (i.e. enterprises).

Moreover, adjustments may be necessary as part of the compilation process. It may be necessary to combine sources based on different units (LKAUs, enterprises, etc.). For instance, which are the statistical units used in SBS or PRODCOM depend the units in the business register, which in turn depend on the national practices to compile the register e.g. whether it is based on a census of addresses, administrative records based on taxes paid, etc. One aspect of this issue is to eliminate from the sources the activities that are out of EGSS scope, typically secondary activities. Their size and importance depends on the type of statistical units used. If the data sources are based on LKAU units, secondary activities can also exist but they can be expected to be smaller. Another aspect regards the producers' secondary activities which are within the EGSS scope but in an activity different from the principal activity. Those are to be included in the EGSS accounts, and they can be reported in the same NACE code as the principal activity but under a different CEPA or CReMA code.

- **Relation between EGSS and other monetary accounts.** When comparing EGSS with other monetary accounts, e.g. EPEA, alignments due to different statistical units may be necessary too. This is not an issue as far as the scope of EGSS and EPEA is purely environmental transactions, but it may become one whenever the compilation uses proxies at one level (e.g. NACE 37 = 100% environmental) and uses shares at another.

Another matching issue is what happens if, for instance, EGSS is compiled at LKAU level but EPEA is compiled at institutional unit (i.e., enterprise) or institutional sector level (i.e. a grouping of institutional units). Breakdowns by NACE or CEPA may not match, even if they conceptually correspond, unless secondary activities are relocated to the corresponding NACE or CEPA. Those adjustments may be particularly easy to identify in the context of an integrated framework for the production of monetary accounts. Such mismatches can be avoided more easily in an integrated system.

Physical environmental accounts normally use LKAU and in some cases units of homogeneous production, i.e. a synthetic unit in which all secondary activities are detached in a separate unit. Compilers of physical environmental accounts are encouraged to use the same units as in the supply-use tables of the national accounts in their countries.

To sum up, institutional units may be engaged in several production activities, some of them being environmental activities and others not. LKAUs may undertake one or several secondary activities besides their principal activity, also some of them not environmental activities. The homogeneity of LKAUs varies across countries depending on the primary data sources available. Primary, secondary and ancillary

activities are all to be covered in the EGSS, as far as they are environmental activities. Activities outside the scope of EGSS must be taken out from the estimates.

2.4. Classifications and other breakdowns used in EGSS accounts

Classifications are useful to break down the characteristics of the EGSS accounts (output, exports, gross value added and employment)⁽¹⁸⁾, both for compilation and presentation purposes.

NACE

The Statistical Classification of Economic Activities in the European Community, Rev. 2 (2008) (NACE Rev. 2) is the standard to report data by industries. An industry is the group of all LKAUs engaged in the same or similar kind-of-activity (ESA 2010, §§ 1.59, 2.150-2.152). Industries and LKAUs are well suited to analyse production processes and technico-economic relationships (ESA 2010, § 2.03). Compiling and reporting EGSS data broken down by NACE is a fundamental condition for comparability of the EGSS accounts with other statistical systems such as national accounts.

Regulation (EU) No 691/2011 requires the data to be broken down by NACE Rev. 2 using the A*21 aggregation level as set out in the ESA 2010 (see Table 1). The EGSS questionnaire proposes an extended breakdown by 39 categories for voluntary reporting (see Annex 3).

Table 1: NACE Rev. 2 A*21 aggregation level for mandatory reporting

NACE Rev. 2 section	NACE Rev. 2 division	Description
A	01-03	Agriculture, forestry and fishing
B	05-09	Mining and quarrying
C	10-33	Manufacturing
D	35	Electricity, gas, steam and air conditioning supply
E	36-39	Water supply; sewerage, waste management and remediation activities
F	41-43	Construction
G	45-47	Wholesale and retail trade; repair of motor vehicles and motorcycles
H	49-53	Transportation and storage
I	55-56	Accommodation and food service activities
J	58-63	Information and communication
K	64-66	Financial and insurance activities
L	68	Real estate activities
M	69-75	Professional, scientific and technical activities
N	77-82	Administrative and support service activities
O	84	Public administration and defence; compulsory social security
P	85	Education
Q	86-88	Human health and social work activities
R	90-93	Arts, entertainment and recreation
S	94-96	Other service activities
T	97-98	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use
U	99	Activities of extraterritorial organisations and bodies

Sources: Eurostat: RAMON - Reference And Management Of Nomenclatures

⁽¹⁸⁾ For the definition of these EGSS characteristics see section 3.1 of this handbook. In general, the EGSS accounts use the definitions for the corresponding transactions, variables and balancing items of the ESA 2010

CEPA AND CREMA

EGSS accounts also require that data are reported broken down by purpose-based classifications of environmental activities e.g. whether the purpose is the protection of ambient air and climate, wastewater management or the management of water resources. More specifically, Regulation (EU) No 691/2011 requires that EGSS data are cross-classified by NACE and classifications of environmental activities.

EP is described in detail in the Classification of Environmental Protection Activities (CEPA 2000) and RM in the Classification of Resource Management Activities (CReMA). Table 2 shows the classes of the two classifications and Table 3 the grouped classes for mandatory reporting.

CEPA 2000, adopted as an international standard at the meeting of the UN Statistical Commission held in March 2002, is a generic, multi-purpose, functional classification for EP. It is used for classifying EP activities but also products. It covers nine classes: protection of ambient air and climate (CEPA 1), wastewater management (CEPA 2), waste management (CEPA 3), protection and remediation of soil, groundwater and surface water (CEPA 4), noise and vibration abatement (CEPA 5), protection of biodiversity and landscapes (CEPA 6), protection against radiation (CEPA 7), environmental research and development (CEPA 8) and other environmental protection activities (CEPA 9). A detailed description of the CEPA classification is available in Annex 4 (also available in the SEEA-CF 2012, Annex I and in Eurostat's Reference And Management Of Nomenclatures database (RAMON⁽¹⁹⁾)).

CReMA is also a generic, multi-purpose, functional classification. CReMA was developed by Eurostat Task Forces.⁽²⁰⁾ It 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). Annex 5 presents definitions and explanatory text for the activities of the CReMA.

⁽¹⁹⁾ http://ec.europa.eu/eurostat/ramon/index.cfm?TargetUrl=DSP_PUB_WELC

⁽²⁰⁾ Important contributions to develop the CReMA were published by Ardi, C. and Falcitelli, F. (2007)

Table 2: Classifications of environmental activities

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
CReMA class	Classification of Resource Management Activities
10	Management of water
11	Management of forest resources
11 A	Management of forest areas
11 B	Minimisation of the intake of forest resources
12	Management of wild flora and fauna
13	Management of energy resources
13 A	Production of energy from renewable sources
13 B	Heat/Energy saving and management
13 C	Minimisation of the intake of fossil resources as raw material
14	Management of minerals
15	Research and development for resource management
16	Other resource management activities

Sources: Eurostat: RAMON - Reference And Management Of Nomenclatures; Regulation (EU) No 691/2011

Table 3: Groupings of CEPA and CReMA classes for mandatory reporting

Class	Description
CEPA 1	Protection of ambient air and climate
CEPA 2	Wastewater management
CEPA 3	Waste management
CEPA 4	Protection and remediation of soil, groundwater and surface water
CEPA 5	Noise and vibration abatement
CEPA 6	Protection of biodiversity and landscapes
CEPA 7+8+9	Protection against radiation, R&D for EP, Other EP activities
CReMA 10	Management of water
CReMA 11	Management of forest resources
CReMA 12+15+16	Management of wild flora and fauna, R&D for RM, Other RM activities
CReMA 13	Management of energy resources
CReMA 13 A	Production of energy from renewable sources
CReMA 13 B	Heat/Energy saving and management
CReMA 13 C	Minimisation of the intake of fossil resources as raw material
CReMA 14	Management of minerals

Sources: Eurostat: RAMON - Reference And Management Of Nomenclatures; Regulation (EU) No 691/2011

CEPA and CReMA are expected to be mutually exclusive so that an identified environmental activity should fit into one and only one of the classes.

If it is not possible to make a clear-cut objective allocation to one and only one environmental class, not even at the most detailed level available (because an activity may in fact serve two environmental purposes), the activity should be allocated to the class deemed to represent the main purpose. The box below shows examples of environmental activities that may be relevant for more than one CEPA or CReMA class. Annex 6 further elaborates recommendations and operational rules for the treatment of borderline cases.

Box 4: Some examples of activities with multiple environmental purposes and their treatment

Insulation materials for use in buildings can serve to protect the environment against noise from inside the building (e.g. noise insulation of discotheques, bottling plants etc.) or to save energy by avoiding thermal losses. Therefore the production of these materials may fall under CEPA 5 or CReMA 13B depending on which one is deemed to be the main purpose. Even at the most detailed level it may not be possible to distinguish whether the production of insulation materials belongs to CEPA 5 or CReMA 13B. In this case it is recommended to classify it as CReMA 13B.

Electric vehicles (plug-in or with hydrogen-fuel cells) are often seen as a means to reduce air pollution and green-house gas emissions when compared to cars that operate with fossil fuel combustion engines. Electric vehicles can also reduce traffic noise emissions. Whether electric vehicles reduce air pollution depends at a global scale mainly on the mode of electricity production. If the production of electricity is based on firing fossil fuels, electric vehicles may contribute little to reducing air pollution at a global scale. At a local scale (e.g. in cities with high traffic density) electric vehicles can reduce air pollution significantly. Therefore it is presumed that the main environmental purpose of manufacturing such vehicles falls under CEPA 1.

Another example is material recovery services. In principle they fall under RM and are allocated to CReMA 11B, CReMA 13C or CReMA 14 depending on the type of material recovered. In certain

cases where the main purpose of material recovery is to avoid other forms of waste disposal, materials recovery may also be allocated to CEPA 3.

A specific case is also the production of energy through incineration of waste. SEEA CF 2012 (p. 259) recommends that the production of energy from the combustion of any kind of waste is included in RM except where the incineration is carried out for the main purpose of waste treatment and disposal (CReMA 13A).

PRODUCT CLASSIFICATIONS

Product classifications are not used in EGSS for reporting breakdowns, but play a role in the compilation of EGSS accounts. Therefore they are briefly explained here, too. At European level there are three main classifications of products – CPA, PRODCOM and CN:

- The Statistical Classification of Products by Activity (CPA 2008) is a complete product classification covering goods and services. Each type of product distinguished in the CPA is defined in such a way that it is normally produced by only one activity as defined in the NACE classification. CPA and NACE classification are linked: The first four digits of any CPA code correspond to the four-digit code of the corresponding NACE level. CPA distinguishes ca. 3100 products.
- The lists of products for statistics on the production of manufactured goods (the PRODCOM list) and its codes are used to classify products from mining and quarrying (NACE section B) and manufacturing (NACE section C). To keep it manageable, similar products are grouped into single items. The list is updated every year and currently contains ca. 3900 items. Each heading has an eight-digit code based on the first four digits of NACE sections B and C in which the producing enterprise is normally classified and the first six digits of the CPA supplemented by additional two digits. Going into more detail than CPA, the PRODCOM can allow for the identification of EP and RM output which is not singled out by CPA codes.
- The Nomenclature governed by the Convention on the Harmonized Commodity Description and Coding System, commonly known as HS Nomenclature, is an international multipurpose nomenclature which was elaborated under the auspices of the World Customs Organization. The HS Nomenclature comprises about 5000 commodity groups which are identified by a 6-digit code and arranged according to a legal and logical structure based on fixed rules. The Combined Nomenclature (CN) of the EU integrates the HS Nomenclature and comprises additional (8-digit) subdivisions and legal notes specifically created to address the needs of the EU. The trade classifications are used mainly for recording trade activities. Their items and sub-items are the fundamental terms on which industrial goods are identified in product classifications (e.g. CPA and PRODCOM⁽²¹⁾). The codes can be linked to other classifications (products or economic activities) via correspondence tables.

ENVIRONMENTAL PRODUCT CATEGORIES

Two broad product categories for voluntary reporting are defined in section 2.1: 'specific environmental products' and 'cleaner and resource efficient products'.

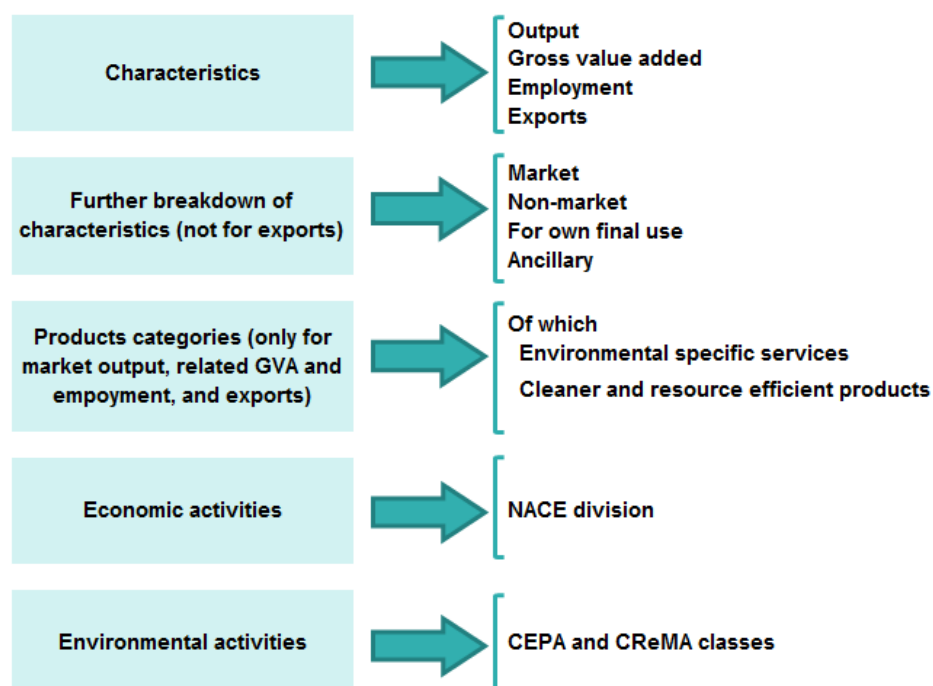
⁽²¹⁾ Most PRODCOM headings correspond to one or more CN codes

3 Framework for data collection

This chapter presents the framework for the Eurostat EGSS data collection. The chapter covers both the mandatory data collection according to Regulation (EU) No 691/2011 and other data for collection on a voluntary basis.

Figure 1 gives an overview of EGSS characteristics and breakdowns.⁽²²⁾ Definitions of the EGSS characteristics are presented in section 3.1. The EGSS reporting tables with further breakdowns by economic and environmental activities and by product categories are introduced in section 3.2. Sub-section 3.2.1 tackles the mandatory reporting of EGSS data in accordance with Regulation (EU) No 691/2011 and sub-section 3.2.2 the voluntary reporting of additional characteristics and details.

Figure 1: Levels of detail for EGSS data collection



⁽²²⁾ 'Characteristics' is the term used in Regulation (EU) No 691/2011 and this term is retained in this handbook. They can also be considered as 'variables'

3.1. Characteristics

Regulation (EU) No 691/2011, Annex V defines the EGSS accounts characteristics that countries must collect, compile and transmit:

- market output, of which
 - exports;
- value added of market activities;⁽²³⁾
- employment of market activities.

On a voluntary basis, Eurostat also collects from countries data on non-market output, output for own final use and ancillary environmental output and related gross value added and employment. Those extensions are necessary to have a complete picture of the EGSS, as the market activities are performed by corporations but not by the Government nor by households. Ancillary activities are also collected for the sake of having the most comprehensive picture of the EGSS economy.

The next sections address the definitions of the characteristics for mandatory and voluntary reporting.

3.1.1. Output

EGSS accounts define output in the same way as in national accounts. It is also valued according to the principles of the national accounts.

National accounts distinguish between market and non-market activities. This is used to attribute institutional units to institutional sectors, as sectors are economic actors with different purposes. This market and non-market classification can also be extended to own account production (i.e., production of output for own final use) and ancillary activities, in the sense that they are all activities for different purposes. Accordingly, EGSS distinguishes a breakdown by market activities, non-market activities, activities for own final use and ancillary activities.

MARKET OUTPUT

Market output is an EGSS characteristic for mandatory reporting, with some additional voluntary breakdowns.

According to the definition and valuation principles for the national accounts, market output

- consists of output that is disposed of on the market or intended to be disposed of on the market (ESA 2010, § 3.17);
- includes products sold at economically significant prices⁽²⁴⁾, products bartered, products used for payments in kind, products supplied by one LKAU to another within the same institutional unit to be used as intermediate inputs or for final uses and products added to the inventories of finished goods and work-in-progress intended for one or other of the above uses (ESA 2010, §§ 3.18-3.19);
- is valued at basic prices which are the prices received from the purchasers plus subsidies on products minus taxes on products⁽²⁵⁾, excluding any transport charges invoiced separately by the producer and excluding any holding gains and losses on financial and non-financial assets (for details see ESA 2010, §§ 3.43-3.44).

The main producers of market output in environmental products are the non-financial corporations sector and the unincorporated enterprises within the household sector.

Data sources available for the compilation of EGSS accounts (see Chapter 4) may not always exactly align

⁽²³⁾ This is the wording in Regulation (EU) No 691/2011. National accounts use the concept "gross value added of market producers". This is explained in section 3.1.3

⁽²⁴⁾ ESA 2010, § 3.19 explains that the economically significant price of a product is defined in relation to the unit that has produced the output. Sold output of unincorporated enterprises owned by households is sold at economically significant prices. For other institutional units, the ability to undertake a market activity at economically significant prices is to be checked by the 50% criterion: To be a market producer, the unit shall cover at least 50% of its costs by its sales over a sustained multi-year period

⁽²⁵⁾ Taxes on products include value added tax, import taxes and other taxes that are payable per unit of a product (ESA 2010, §§ 4.16-4.21). Subsidies on products include import subsidies and other subsidies that are payable per unit of a product (ESA 2010, §§ 4.33-4.35). It is to be noted that the taxes to be subtracted and subsidies to be added to the price received from the purchasers do not cover those that are not payable per unit of a product produced or transacted

to the definitions and valuation principles listed above. Approximations may be acceptable for EGSS accounts, for example when Structural Business Statistics (SBS) and Statistics on the Production of Manufactured Goods in the European Community (PRODCOM statistics) are used as a source. However, even when approximations are acceptable the compilers of EGSS accounts should strive to make conceptual adjustments to align to national accounts principles wherever it can have a significant impact and adequate data sources are available. This is especially relevant for goods. The box below explains the conceptual differences between the EGSS market output definition and the definition of the variables in SBS and PRODCOM and the consequences of using the latter as an approximation to the former.

Box 5: Turnover and production value as proxies for market output

Turnover is one of the variables of Regulation (EC) No 295/2008 concerning structural business statistics (in short SBS Regulation) and it is available at NACE Rev. 2 class level. The SBS Regulation covers NACE Rev. 2 sections B to N and Group S95, which broadly speaking covers market activities (for more detail, see [SBS metadata on Eurostat's website](#)).

Turnover comprises the totals invoiced by the observation unit during the reference period, and this corresponds to market sales of goods or services supplied to third parties; it includes all duties and taxes on the goods or services invoiced by the unit with the exception of the VAT invoiced by the unit to its customer and other similar deductible taxes directly linked to turnover; it also includes all other charges (transport, packaging, etc.) passed on to the customer. Price reductions, rebates and discounts as well as the value of returned packing must be deducted.

Compared to market output as defined in national accounts, turnover excludes:

- products added to the inventories of finished goods and work-in-progress;
- products bartered or used for payments in kind;
- products supplied by one LKAU to another within the same institutional unit to be used as intermediate inputs or for final uses;
- subsidies on products.

whereas it does not exclude the value of:

- sales of finished goods and work-in-progress from inventories;
- sales of products bought for resale;
- taxes on products except for value added type taxes.

The SBS Regulation also introduces the production value, which is closer than turnover to output as defined and valued in national accounts. It 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 stocks of finished products, work in progress and goods and services purchased for resale, minus the purchases of goods and services for resale, plus capitalised production, plus other operating income (excluding subsidies). Income and expenditure classified as financial or extraordinary in business accounting is excluded from production value. The SBS production value may be preferred as a better approximation for market output whenever data are available. In practice, some differences with market output in national accounts remain: the production value includes capitalised production (production for own final use) but excludes subsidies on products.

Data on the value of sold production as reported in the PRODCOM statistics could be used as another approximation for EGSS market output. When using PRODCOM it must be borne in mind that it relates to products (not to activities) and is therefore not strictly comparable with the activity-based SBS. In particular, if a material is sold to another unit that further processes it, the new product is only accounted in PRODCOM if it meets the description of a different position on the PRODCOM list than the material. This is conceptually different to national accounts which would not exclude the value of the new product (however, also national accounts do not double count the original material in case of processing to order). When using PRODCOM for EGSS accounts it will be hardly possible to control for this conceptual difference, in particular if the degree of vertical disintegration of processes is very high. Another conceptual difference is that PRODCOM data refer to the production sold and do not include products added to the inventories of finished goods and work-in-progress.

In all cases above it may be useful to consult national accounts compilers on the adjustments they make when using these data sources.

Two categories of market output for voluntary reporting are environmental specific services and cleaner and resource efficiency products. They are defined in section 2.1. These are 'of which' categories, meaning that their total does not necessarily match the total market output.

NON-MARKET OUTPUT

Non-market output is an EGSS characteristic for voluntary reporting.

According to the national accounts definition, non-market output is output provided to other units for free, or at prices that are not economically significant (ESA 2010, § 3.23).⁽²⁶⁾ The main producers of non-market output are the general government sector and the non-profit institutions serving households sector.

EGSS non-market output covers a wide range of specific services such as regulation services, monitoring of environmental parameters, environmental control of enterprises, public approval procedures for environmentally relevant projects (e.g. environmental compatibility assessments). EGSS non-market output also covers some consulting, R&D and education in the domains of EP and RM or the production of environmental statistics. Wastewater or waste collection and treatment services may also be provided free or at prices not economically significant.

Non-market output is to be valued as the sum of costs of production i.e., the sum of intermediate consumption, compensation of employees, consumption of fixed capital and other taxes on production less other subsidies on production (ESA 2010, § 3.49).

OUTPUT PRODUCED FOR OWN FINAL USE

Output produced for own final use is an EGSS characteristic for voluntary reporting.

According to the national accounts definition, 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).

Products for own final consumption can only be produced by the household sector, whereas products used for own gross fixed capital formation⁽²⁷⁾ can be produced by any sector of the economy (ESA 2010, §§ 3.21-3.22).

An example of a good produced for own final consumption can be photovoltaic electricity generated by households. The part of the electricity output that is not fed into the electricity grid (i.e. sold at so-called feed-in tariffs) but is directly consumed by the household or stored for later use in the same household (e.g. by using modern accumulator technology) falls under output for own final use. Other forms of energy production for own final consumption may include, for example, fuel wood and heat from heat pumps.

An example of own-account production for gross fixed capital formation is the manufacturing of specific equipment used for EP or RM not sold but used for capital formation in the same institutional unit. Production for own final use of environmental products is likely to be a minor sub-category of EGSS output. Nevertheless, it is conceivable that, for example, a producer of photovoltaic panels installs some of these panels in own production sites, which would be an example of own account gross fixed capital formation.

A more relevant example of own account production for gross fixed capital formation in EGSS may be research and development. According to ESA 2010 expenditure on own-account R&D is only to be recorded as fixed capital formation when a sufficiently high level of reliability and comparability of the estimates across Member States has been achieved (ESA 2010, § 3.22.e). Given that the development and improvement of environmental products can be very R&D-intensive, it is recommended to include own-account R&D in EGSS accounts wherever sources allow estimating it.

Other examples of own account production for gross fixed capital formation may be found when establishments construct or extend facilities used for environmental activities with their own staff. For example, if an establishment engaged in wastewater treatment carries out major repairs of or extends its sewage plants using own staff the output of these activities qualifies for being recorded under EGSS own

⁽²⁶⁾ Similarly to the definition of economically significant price (ESA 2010, § 3.19) prices are not economically significant if the sales cover less than 50% of the costs of the output provided to other units over a sustained multi-year period

⁽²⁷⁾ Gross capital formation includes gross fixed capital formation, changes in inventories and acquisitions less disposal of valuables (ESA 2010, § 3.122). As products added to the inventories of finished goods and work in progress intended for later sale, bartering, payment in kinds or supply to another establishment of the same institutional unit is already included in market output (§ 3.18), EGSS output retained for own capital formation may include in practice only that used for gross fixed capital formation.

account production for gross fixed capital formation.

Also all construction works undertaken by the members of a household for the energetic refurbishment of their own dwelling falls under EGSS own account production for gross fixed capital formation. Following the provisions of ESA 2010 this would also include communal refurbishment activities undertaken by groups of households (ESA 2010, § 3.22.c).

Output for own final use is to be valued at the basic prices of similar products sold on the market or, if not possible, at the costs of production (for more detail see ESA 2010, § 3.45). The costs of production (sum of cost approach) cover the intermediate consumption, compensation of employees, consumption of fixed capital, other taxes on production less other subsidies on production and a mark-up (except for non-market producers) for net operating surplus.

ANCILLARY OUTPUT

Ancillary output is an EGSS characteristic for voluntary reporting.

According to the national accounts definition, ancillary activity is an activity whose output is intended for use within an enterprise (ESA 2010, § 3.12). The output of ancillary activities is called ancillary output.

The difference between ancillary output and output for own final use (see previous category) is that the former will re-enter into production processes and be further transformed, whereas the latter is for final use (either consumption or fixed capital formation). Some goods may be used within an enterprise as intermediate consumption and others may be used as gross fixed capital formation (i.e. investment) and the distinction is very important in this context: the production of the former will be accounted as ancillary output whereas the latter as own gross fixed capital formation. In order to be output for own gross fixed capital formation the product must be a capital asset, which ESA 2010 calls 'produced non-financial asset'. Those are defined as outputs from production processes which are used repeatedly or continuously in production for more than one year (ESA 2010 § 7.22).

Ancillary environmental activities are activities that 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 EP services such as monitoring exhaust gas emissions.

National accounts does not record separately the ancillary output (ESA 2010, § 1.31). In this point EGSS deviates from national accounts. In the national accounts all inputs consumed by an ancillary activity - materials, labour, consumption of fixed capital, etc.- are treated as inputs of the principal or secondary activity which the ancillary activity supports. Correspondingly ancillary activities have no value added attributed in national accounts, all value added is attributed to the principal or secondary activity.

In EGSS accounts in-house services for EP or RM undertaken by a producer to limit its own pollution or resource use are considered as ancillary output and recorded as such. This follows from the need to give a complete picture of the environmental activities in the economy. Enterprises can choose between engaging in ancillary activities or purchasing such services on the market from service providers. Whenever we are interested to know how many people are engaged in the production of services that avoid pollution and what the labour productivity of this production is, it is necessary to include also those pollution avoiding activities that are carried out in-house within the enterprises and not only those that are contracted from another company.

Note that households can only engage in ancillary activities as regards their production activities, not of their consumption. If a household does not have any production activities it cannot have any ancillary activities either.

This handbook recommends including as a separate category ancillary EGSS output that supports the production of non-environmental products⁽²⁸⁾, whereas ancillary EGSS output for the production of environmental products is considered to be already implicitly recorded in the output value of these products.

Neither ESA 2010 nor SEEA-CF 2012 provides rules for the valuation of ancillary output. SNA 2008 § A3.4 treats the value of output in the case of a producer unit recognised as an ancillary establishment (i.e. as a separate establishment). The value of output of such an establishment should be derived on a sum of costs basis.

⁽²⁸⁾ For the sake of accuracy, please note that 'non-environmental products' in this section, as well as in sections 3.1.3 and 3.1.4 actually means 'products outside the EGSS boundary'. EGSS includes cleaner and resource efficient products, which may be non-characteristic environmental products

This handbook recommends to value ancillary output as the sum of costs. The sum of costs should cover intermediate consumption, compensation of employees, consumption of fixed capital, other taxes on production less other subsidies on production and a mark-up (except for non-market producers) for net operating surplus. It may, however, be difficult to quantify some of the above cost elements for an ancillary activity. For example, if there are no records on which of the fixed assets of a unit are used for its ancillary environmental activities and on the share of their use for the ancillary activity, estimates may have to be made. The same may apply for taxes, subsidies and the net operating surplus mark-up.

Taking into account only the intermediate consumption and the compensation of employees (the current expenditure) may deliver a sufficiently good valuation of ancillary output, in particular if no specific equipment is used for the ancillary activity. However, some of the equipment used for ancillary activities may be specific for them (e.g. apparatus to monitor exhaust gases or an oven for waste incineration). In this case an allocation to the ancillary activity can be made. However, the provisions (legal and technical) for reporting such detailed information and for transmission to the statistical system may not exist. Consequently if no specific information is available to EGSS compilers, it is recommended to use the share of current expenditure for the ancillary activity in the total current expenditure of unit or industry as a proxy for the ancillary activity's share of the other costs elements. Such a pro-rata approach will not result in a very precise valuation, but is a starting point that can be improved when more detailed information becomes available.

With the development of the production of renewable energy, which is by nature often decentralised, many producers pertaining to various industries produce electricity or heat for their own internal needs. In order to ensure a maximum of comprehensiveness and comparability of the data this handbook recommends to include this EGSS output as the same type of output as in national accounts i.e., market output, non-market output or ancillary output (for more details see the Box 6).

Box 6: Treatment of production of renewable energy in an establishment for own use

Production of renewable energy for own use is to be recorded in EGSS, even in the cases when national accounts records no output because the activity is considered an ancillary activity.

Eurostat publication 'NACE Rev. 2 statistical classification of economic activities in the European Community' lists in its paragraph 53.d cases that are not to be regarded as ancillary activities. Among these cases is the production of energy (an integrated power plant or coking plant), even if the whole output is consumed by the parent unit. Paragraph 54 of this publication recommends distinguishing separate establishments for the production of energy where separate data are available.

SNA 2008 mentions that there are occasions in which it may be desirable to record also goods used as intermediate consumption in the same establishment (SNA 2008, § 6.120). This handbook recommends including all production of renewable energy in EGSS accounts even if separate establishments cannot be distinguished. Potential sources for estimating the total value (covering market, non-market and in-house production) can come from energy statistics, regulatory data (e.g. feed-in-tariffs) and national accounts and their combination in a suitable model calculation.

National accounts practices for recording production of energy by establishments for their own use (as intermediate consumption) vary across countries from recording it as ancillary activity, which means no separate recording as output, to recording it as secondary output. This handbook recommends that EGSS follow the same treatment as in the country's national accounts. Therefore production of energy from renewable sources for own use (as intermediate consumption) may be recorded in EGSS either as secondary output (if accounted for in the national accounts) or as ancillary output (if not accounted for in the national accounts). The secondary output should be classified as market or non-market according to the classification of the producer as market or non-market producer.

3.1.2. Exports

Exports of EGSS market output is a characteristic of mandatory reporting under Regulation (EU) No 691/2011.

EGSS follow the ESA 2010 definition of exports: exports of goods and services consist of transactions in

products (sales, barter, and gifts) from residents to non-residents (ESA 2010, § 3.158). In national accounts exports occur when the economic ownership of the good changes between resident units and non-resident units (ESA 2010, § 3.162) or when a service is rendered by a resident to a non-resident (ESA 2010, § 3.171). This change-of-ownership principle applies irrespective of the existence of corresponding physical movements of goods across frontiers.

The distinction between market, non-market, ancillary and for own final use does not exist for exports. An export can only occur for products produced in market activities as an export is a transaction between two units (of which one is resident and the other is a non-resident), whereas all non-market output, ancillary and for own final use output produced by resident units is consumed by resident units. By convention also services provided by government or NPISH units for free to the population of another country (e.g. humanitarian and technical assistance) is final consumption by the residents of the country whose government or NPISH units provides this service.

A special provision is necessary for multinational companies: a delivery from a non-resident affiliate of a resident enterprise to a non-resident one is not an export (ESA 2010, § 3.160.a.1) whereas the delivery of a resident affiliate of a non-resident enterprise to a non-resident should be included in the exports of EGSS output. For trade between resident and non-resident affiliates of the same enterprise there are special provisions: it is an export if the affiliate receiving the product makes the decision about the level of supply and prices of its output sold to the market under own responsibility (ESA 2010, § 3.163).

Detailed lists of cases of exclusion and inclusion in exports are available in ESA 2010, §§ 3.164-3.166 and 3.173.

In national accounts exports may include unprocessed imported goods, for example the resale of an imported good to a non-resident, which is called merchanting (ESA 2010, § 3.164.d). As the Regulation (EU) No 691/2011 asks to report on exports as an 'of-which' item of output, merchanting is excluded from the scope of EGSS. This is in line with the general exclusion of wholesale and retail trade from the scope of EGSS.

Exported repair and processing services on behalf of non-residents are to be recorded net, i.e., as an export of services excluding the value of the goods processed or repaired. Installation of equipment abroad is exports only when the project is of limited duration by its nature (e.g. less than 1 year).

Exports in national accounts are valued free on board (FOB), i.e. at the border of the exporting country for goods and at basic prices for services (ESA 2010, § 3.168).⁽²⁹⁾ The FOB-value of goods covers the following: the value of the goods at basic prices, related transport and distributive services up to the point of the border (including the cost of loading on to a carrier for onward transportation), any taxes less subsidies on the goods exported (for intra-EU deliveries including VAT and other taxes on the goods paid in the exporting country).

The valuation of exports of goods in the EGSS accounts differs from national accounts. In the EGSS accounts exports of goods should be valued at basic prices as EGSS considers exports from the supply side (i.e. the part of output which is exported). The exclusion of export related transport and distributive services is also in line with the exclusion of wholesale and retail trade from the scope of EGSS. If export data of environmental goods are valued FOB, compilers of EGSS accounts should make appropriate valuation adjustments if related transport and distributive services as well as taxes less subsidies on the goods are significant and available source allow to estimate such adjustment.⁽³⁰⁾

3.1.3. Gross value added

Gross value added (GVA) is defined as the balancing item of the production account before the consumption of fixed capital, i.e. output at basic prices minus intermediate consumption at purchasers' prices (ESA 2010, § 9.06). This balancing item is conventionally considered to be valued at basic prices.

Gross value added can also be calculated from the expenditure side and from the income side. In the first case it is the sum of final consumption expenditure (by Government, households and non-profit institutions) plus gross fixed capital consumption (and changes in inventories) plus exports minus imports. In the latter case it is the sum of compensation of employees (i.e. salaries) plus gross operating surplus (i.e., companies' profits) plus taxes minus subsidies on production.

⁽²⁹⁾ However in the supply and use tables, imports of goods are valued at the cost –insurance-freight (CIF)

⁽³⁰⁾ The EGSS Practical Guide 2016 edition, Chapter 3, provides examples of how to use coefficients to correct for valuation differences

GVA is a cornerstone concept in national accounts, with even higher importance than output, because in an economy producers supply goods and services to other producers, not only to the final consumers. Producers may use those goods and services as intermediate consumption in their own activities, to further elaborate them creating value added. For instance, a farmer produces wheat that a miller uses (as intermediate consumption) to produce flour that a baker uses to produce bread that a restaurant uses to provide a served meal to the final consumer. Adding the output of all producers in the country would lead to double-counting, instead add the GVA of all producers delivers the correct total output.

Following the definition of national accounts, intermediate consumption consists of products consumed as inputs by a process of production, excluding fixed assets, whereby the products are either transformed or used by the production process (ESA 2010, § 3.88). Paragraphs 3.89 and 3.90 list cases included and excluded. In particular, products which are received from another LKAU of the same institutional unit are included in intermediate consumption. Products used for intermediate consumption are valued at purchasers' prices prevailing at the time the products are used in the process of production (ESA 2010, § 3.91).

If an EGSS producer also produces non-environmental products the intermediate consumption should be split into a part relating to the production of the environmental products and a part relating to the non-environmental products. Only the part relating to the environmental products is to be subtracted from EGSS output to calculate EGSS gross valued added. In the compilation practice this subtraction will often be done implicitly, for example, when ratios GVA / output derived from national accounts data are applied to calculate EGSS GVA from EGSS output. Alternatively, if the split into the parts relating to the production of the environmental products and relating to the non-environmental by-products cannot be made (neither explicitly nor implicitly), intermediate consumption of EGSS is to be adjusted proportionally according to the share of the non-environmental by-product in the total output of the EGSS market activity. If also this share information is not available the by-products may be exceptionally counted towards EGSS output and the total intermediate consumption of the EGSS activity is to be subtracted in order to calculate the EGSS GVA.

Regulation (EU) No 691/2011 requires countries to report the GVA corresponding to market activities of the EGSS. This concept does not exist in national accounts. The concept of market and non-market exists for output and for producers but not for GVA (ESA 2010, §§ 3.17, 3.23, 3.24, 3.26). Because the concept of GVA of market activities is listed in the Regulation, it is understood in this handbook that it means the GVA generated in the production of EGSS market output. If a producer is engaged in environmental and non-environmental (market) activities, only the former are recorded in EGSS. If there is no detailed information about the producer activities to make the distinction between environmental and non-environmental activities, the split can be done on a pro rata basis or with some coefficients.

Estimating the GVA of market activities would in theory consist of isolating the individual statistical units which only perform market production from those performing non-market activities, but not both. Disaggregating this way it is possible to produce the GVA estimates requested in the Regulation. However, if it is not possible to go down in such a level of detail, the problem is how to estimate which part of the intermediate consumption is used to produce market output and which to produce non-market output. A pro-rata approach (based on the ratios of market and non-market output to total output) can be used in those cases.

Whereas the Regulation only requires the GVA for the market activities, the voluntary part of the Eurostat data collection also encompasses the GVA related to non-market activities, production for own final use and ancillary environmental output.⁽³¹⁾

Only the GVA of ancillary environmental activities that support the production of non-environmental products should be recorded, whereas ancillary environmental activities that support the production of environmental products do not have to be separately identified. This is to avoid double counting with the GVA due to the non-ancillary production of environmental products. In practice, however, this distinction may be difficult to implement in full in surveys and other approaches are needed to estimate the EGSS gross value added. As a practical approach this handbook recommends not to account the gross value added (and output and employment) of ancillary environmental activities of the NACE divisions 37-39 (Sewerage; waste collection, treatment and disposal activities; materials recovery; remediation activities and other waste management services). For other industries (e.g. manufacturing) it may be assumed that ancillary environmental activities serve primarily to make their non-environmental production environmentally more friendly and resource efficient. Under this assumption adding a separate estimate of

⁽³¹⁾ with ancillary environmental output falling outside the production boundary of the national accounts

the gross value added linked to ancillary EGSS activities would not result in a double counting.

3.1.4. Employment

Regulation (EU) No 691/2011 asks to report the employment corresponding to market activities of the EGSS.

The definition of employment in EGSS is the same as in national accounts (ESA 2010, § 11.11). Employment in EGSS market activities consists of all persons engaged in productive EGSS market activities that fall within the production boundary of the national accounts. Persons in employment are employees or self-employed persons according to the definitions and categories listed in ESA 2010 §§ 11.13-11.14 and 11.115-11.16.

If an EGSS producer is also engaged in non-environmental activities the employment should be split into a part relating to the production of the environmental products and a part relating to the non-environmental products. Only the part relating to the environmental products is to count towards EGSS employment.⁽³²⁾

Whereas the Regulation only requires the employment for the market activities, the voluntary part of the Eurostat data collection also encompasses the employment related to non-market activities, production for own final use and ancillary environmental output. In the compilation practice the restriction to that part relating to the environmental products will often be made implicitly, for example, when employment: output ratios derived from national accounts data are applied to calculate EGSS employment from EGSS output. Alternatively, if data do not allow to exclude the part relating to the by-product (neither explicitly nor implicitly), employment is to be adjusted proportionally according to the share of the non-environmental by-product in the total output of the market activity. If also this share information is not available the total employment of the activity is (exceptionally) to be counted towards EGSS employment.

It is to be noted that employment in ancillary environmental activities should only be reported if the related GVA and output are also reported in the EGSS accounts. This is to ensure scope consistency between the characteristics of the EGSS accounts.

According to the Regulation, EGSS employment is to be reported in full-time equivalents (FTEs). The full-time equivalent is the number of full-time equivalent jobs, defined as total hours worked divided by average annual hours worked in full-time jobs (ESA 2010, §§ 11.32-11.34). FTE is a unit of employment not used as frequently in national accounts or in social statistics as persons employed, hours worked or jobs. The reason for EGSS to report employment in FTE is that many environmental activities may be performed on a part-time basis, in the sense that jobholders may be engaged indistinctively in environmental and non-environmental activities in the same job. In those circumstances, reporting employment measured in number of persons risks to provide a biased picture (underreporting or overreporting depending on the circumstances).

Data measured in FTE may not be readily available in the basic sources for EGSS employment. In practice, estimates of persons employed or jobs can be converted into FTEs based on ratios between persons in employment or jobs and FTEs. Conversion coefficients can be calculated e.g. based on the shares of part-time workers and full-time workers or hours worked part and full time. This information is available from specific sources such as the Labour Force Survey.⁽³³⁾

3.2. Eurostat EGSS questionnaire

The Eurostat questionnaire reflects the scope of the EGSS data collection, e.g. characteristics and breakdowns for reporting. The questionnaire is also the common format that national EGSS compilers are requested to use for transmitting data to Eurostat. The questionnaire is presently a set of Excel

⁽³²⁾ In the compilation practice the restriction to that part relating to the environmental products will often be made implicitly, for example, when employment: output ratios derived from national accounts data are applied to calculate EGSS employment from EGSS output. Alternatively, if data do not allow to exclude the part relating to the by-product (neither explicitly nor implicitly), employment is to be adjusted proportionally according to the share of the non-environmental by-product in the total output of the market activity. If also this share information is not available the total employment of the activity is (exceptionally) to be counted towards EGSS employment

⁽³³⁾ Only in exceptional cases where such information is not available it may be acceptable to assume a conversion factor equal to one. This would, however, most likely result in an overestimation by 1-10% of EGSS employment measured in FTE

spreadsheets in one workbook. In the next years there will be a transition to the SDMX standard.⁽³⁴⁾

One questionnaire collects data for only one reference year. Data for two different years should be reported in two separate questionnaires (Excel workbooks). This is the case e.g. if a country wants to revise data for the preceding year alongside the transmission of the data due in the present year. This limitation will be overcome after the changeover to SDMX.

The questionnaire has one data reporting spreadsheet per characteristic: output, gross value added, exports and employment. All data shall be reported in million national currencies, except employment which shall be reported in full time equivalents. Each of these spreadsheets distinguishes the cells for mandatory reporting according to Annex V of Regulation (EU) No 691/2011 and cells for voluntary reporting.

In addition to the data reporting sheets, the questionnaire includes a cover sheet, an index, basic instructions and detailed explanatory notes. The basic instructions include organisational background information on the transmission deadline and infrastructure, contacts, country codes, reference years, symbols, etc. The detailed explanatory notes provide methodological information such as definitions and valuation of the characteristics to be reported, information on the classifications to be used and the treatment of confidentiality. It is strongly recommended that national data compliers carefully read the instructions and explanatory notes before filling out the reporting tables.

Besides the questionnaire, countries must provide quality reports on the EGSS accounts according to Article 3 of the Commission Implementing Regulation (EU) 2015/2171. These reports shall inform on the quality of sources used for data transmitted, the adjustments made to basic statistics to make the result align to the concepts and definitions of the accounts or for other methodological reasons, the estimation and compilation of data which cannot be derived directly from statistical sources, the breaks in time series resulting from changes in methodology or data sources and the steps taken to ensure time series are as comparable as possible.

3.2.1. Mandatory reporting

As explained in section 3.1, mandatory reporting on the EGSS covers the following characteristics:

- market output, of which
- exports;
- value added of market activities;
- employment of market activities.

For these characteristics the data shall be reported cross-classified by

- economic activities by the NACE Rev. 2 A*21 aggregation level as set out in ESA 2010, and by
- groups of CEPA and CReMA classes.

Figure 2 presents as example those cells of the data reporting sheet for output that are used for the mandatory reporting.

⁽³⁴⁾ Statistical Data and Metadata eXchange (SDMX) standardises the way data are organised and exchanged and provides international guidelines on how to shape the data. See <http://ec.europa.eu/eurostat/data/sdmx-data-metadata-exchange>

Figure 2: EGSS data collection questionnaire - reporting of market output (cut-out from the questionnaire)

Country:		A. Environmental Protection															B. Resources Management						
Year:																							
Unit:	MIO_NAC																						
Output		CEPA 1	CEPA 2	CEPA 3	CEPA 4	CEPA 5	CEPA 6	CEPA 7 + CEPA 8 +CEPA 9		CRoMA 10	CRoMA 11	CRoMA 13	CRoMA 13 A	CRoMA 13 B	CRoMA 13 C	CRoMA 14	CRoMA 12 + CRoMA 15 + CRoMA 16						
NACE		Protection of ambient air and climate	Wastewater management	Waste management	Protection and remediation of soil, groundwater and surface water	Noise and vibration statement	Protection of biodiversity and landscapes	Protection against radiation, research and development (RAD) and Other		Management of water	Management of forest resources	Management of fossil energy resources	Production of energy from renewable sources	Heat energy saving and management	Minimisation of the intake of fossil resources as raw material	Management of minerals	Management of wild flora and fauna - Research and development (RAD) and Other						
Market output A - Agriculture, forestry and fishing																							
Market output B - Mining and quarrying																							
Market output C - Manufacturing																							
Market output D - Electricity, gas, steam and air conditioning supply																							
Market output E - Water supply; sewerage, waste management and remediation activities																							
Market output F - Construction																							
Market output G - Wholesale and retail trade																							
Market output H - Transportation and storage																							
Market output I - Accommodation and food service activities																							
Market output J - Information and communication																							
Market output K - Financial and insurance activities																							
Market output L - Real estate activities																							
Market output M - Professional, scientific and technical activities																							
Market output N - Administrative and support service activities																							
Market output O - Public administration and defence, compulsory social security																							
Market output P - Education																							
Market output Q - Human health and social work activities																							
Market output R - Arts, entertainment and recreation																							
Market output S - Other service activities																							
Market output T - Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use																							
Market output U - Activities of extraterritorial organizations and bodies																							

3.2.2. Voluntary reporting

CHARACTERISTICS FOR VOLUNTARY REPORTING

Besides the market output, the questionnaire allows to report the non-market output, output for own final use and ancillary output. The same is possible for gross valued added and employment related to those types of production.

The questionnaire also allows reporting the total output, total gross valued added and total employment (total of market, non-market, for own final use and ancillary breakdowns).

BREAKDOWN BY PRODUCT CATEGORIES

As concerns market activities and its characteristics (output, exports, gross valued added and employment) the questionnaire allows for voluntary reporting of two separate 'of-which' categories of environmental products: *environmental specific services* and *cleaner and resource efficient products* (for definitions see section 2.1).

It is to be noted that the total values for the characteristics of the market activities can be higher than the sum of the values for *environmental specific services* and *cleaner and resource efficient products* as the EGSS can also produce *environmental specific goods*. The reporting tables do not ask for a separate reporting of environmental specific goods. However, they should be included in the totals of the market activities and therefore their values should be identifiable as the differences between the totals and the sums for the categories environmental specific services and cleaner and resource efficient products.

Figure 3: EGSS data collection questionnaire: reporting of non-market output, output for own final use and ancillary output and product categories (cut-out from the questionnaire)

Unit:	MIO_NAC		
Output		CEPA 1	
NACE		Protection of ambient air and climate	footnotes
Total output C28 - Manufacture of machinery and equipment n.e.c.			
ancillary output			
non-market output		-	
output for own final use			
market output, of which:			
environmental specific services		-	
cleaner and resource efficient products			

MORE DETAILED BREAKDOWNS BY ENVIRONMENTAL AND ECONOMIC ACTIVITIES

A more detailed breakdown by environmental and economic activities than required in Regulation (EU) No 691/2011 is possible on a voluntary basis. This applies to the voluntary non-market activities, production for own final use and ancillary activities, but also to the mandatory market activities and their product categories.

The more detailed breakdown of environmental activities consists in the following:

- protection of climate and ozone layer as an 'of-which' position of CEPA 1 (protection of ambient air and climate);
- CEPA 7 (protection against radiation), 8 (Research and development (R&D) for environmental protection) and 9 (other EP activities) can be reported separately;
- R&D activities for the protection of climate and ozone layer as 'of-which' positions of CEPA 8 (R&D activities for EP);
- management of forest areas and minimisation of the intake of forest resources as an 'of-which' positions of CReMA 11 (management of forest resources);
- CReMA 12 (management of wild flora and fauna), 15 (R&D for resource management) and 16 (other RM activities) can be reported separately;
- R&D activities for the production of energy from renewable sources as an 'of-which' position of CReMA 15 (R&D for RM).

Table 4 gives an overview of the mandatory and voluntary breakdown of EGSS accounts by CEPA and CReMA.

Table 4: Mandatory and voluntary reporting by CEPA and CReMA

Class	Description
CEPA 1	Protection of ambient air and climate
of which sum of CEPA 1.1.2 & 1.2.2	Protection of climate and ozone layer
CEPA 2	Wastewater management
CEPA 3	Waste management
CEPA 4	Protection and remediation of soil, groundwater and surface water
CEPA 5	Noise and vibration abatement
CEPA 6	Protection of biodiversity and landscapes
CEPA 7+8+9	Sum of CEPA 7, 8, 9
CEPA 7	Protection against radiation
CEPA 8	R&D for EP
of which CEPA 8.1.2	R&D activities for the protection of climate and ozone layer
CEPA 9	Other EP activities
CEPA 1-9	Total CEPA
CReMA 10	Management of water
CReMA 11	Management of forest resources
of which CReMA 11 A	Management of forest areas
of which CReMA 11 B	Minimisation of the intake of forest resources
CReMA 13	Management of energy resources
CReMA 13 A	Production of energy from renewable sources
CReMA 13 B	Heat/Energy saving and management
CReMA 13 C	Minimisation of the intake of fossil resources as raw material
CReMA 14	Management of minerals
CReMA 12+15+16	Sum of CReMA 12, 15, 16
CReMA 12	Management of wild flora and fauna
CReMA 15	R&D for RM
of which CReMA 15.5.1	R&D for the production of energy from renewable sources
CReMA 16	Other RM activities
CReMA 10-16	Total CReMA
CEPA 1-9 + CReMA 10-16	Total CEPA and total CReMA

Note: mandatory items in **bold** characters

The more detailed reporting by economic activities consists of the following (for details see Table 5):

- Manufacturing (NACE section C) uses the A*38 NACE aggregation level of the ESA transmission programme;
- Professional, scientific and technical activities (NACE section M) are split into NACE M69_M70 (legal and accounting activities; activities of head offices; management consultancy activities), NACE M71 (architectural and engineering activities; technical testing and analysis), NACE M72 (scientific research and development) and NACE M73-M75 (advertising and market research; other professional, scientific and technical activities; veterinary activities);
- Water supply; sewerage, waste management and remediation activities (NACE E) use the A*88 NACE aggregation level.

Table 5: Mandatory and voluntary reporting by NACE

Section/Division	Description
A	Agriculture, forestry and fishing
B	Mining and quarrying
C	Manufacturing
C10_C12	Manufacture of food products, beverages and tobacco products
C13_C15	Manufacture of textiles, wearing apparel, leather and related products
C16_C18	Manufacture of wood and paper products, and printing
C19	Manufacture of coke and refined petroleum products
C20	Manufacture of chemicals and chemical products
C21	Manufacture of basic pharmaceutical products and pharmaceutical preparations
C22_C23	Manufacture of rubber and plastic products, and other non-metallic mineral products
C24_C25	Manufacture of basic metals and fabricated metal products, except machinery and equipment
C26	Manufacture of computer, electronic and optical products
C27	Manufacture of electrical equipment
C28	Manufacture of machinery and equipment n.e.c.
C29_C30	Manufacture of transport equipment
C31_C33	Manufacture of furniture; other manufacturing; repair and installation of machinery and equipment
D	Electricity, gas, steam and air conditioning supply
E	Water supply; sewerage, waste management and remediation activities
E36	Water collection, treatment and supply
E37	Sewerage
E38	Waste collection, treatment and disposal activities; materials recovery
E39	Remediation activities and other waste management services
F	Construction
G	Wholesale and retail trade
H	Transportation and storage
I	Accommodation and food service activities
J	Information and communication
K	Financial and insurance activities
L	Real estate activities
M	Professional, scientific and technical activities
M69_M70	Legal and accounting activities; activities of head offices; management consultancy activities
M71	Architectural and engineering activities; technical testing and analysis
M72	Scientific research and development
M73-M75	Advertising and market research; other professional, scientific and technical activities; veterinary activities
N	Administrative and support service activities
O	Public administration and defence, compulsory social security
P	Education
Q	Human health and social work activities
R	Arts, entertainment and recreation
S	Other service activities
T	Activities of households as employers; undifferentiated goods and services producing activities of households for own use
U	Activities of extraterritorial organizations and bodies

Note: mandatory items in **bold** characters

4

Methods to compile EGSS accounts

EGSS is not a distinct activity in standard statistical nomenclatures as is, for example, agriculture or the manufacture of motor vehicles. It encompasses activities classified under many different divisions and groupings of the NACE classification. Only a few NACE divisions are so closely related to the EGSS that they may be considered as almost entirely being part of the EGSS, e.g. establishments grouped under NACE divisions 37 (Sewerage) and 38 (Waste collection, treatment and disposal activities; materials recovery). Other EGSS activities cannot be easily identified from NACE. For example, some activities providing environmental services may be included under NACE divisions 71 (Architectural and engineering activities, technical testing and analysis), 72 (Scientific research and development) and 74 (Other professional, scientific and technical activities) together with non-environmental services.⁽³⁵⁾ NACE division 35 (Electricity, gas, steam and air conditioning supply) does not distinguish electricity and gas generating activities by the type of energy source used, i.e. whether it is produced from a renewable source (e.g. wind, biomass) or from a non-renewable one (e.g. coal, natural gas).

Therefore compilation of EGSS accounts relies on additional information, either direct information (e.g. obtained from specific EGSS surveys) or indirect information (e.g. obtained from a combination of already existing information using modelling techniques).

Two main EGSS compilation approaches can be distinguished according to the use of sources:

- *Micro data* (i.e. data on single producer units) can be used to identify a population of EGSS producers and then aggregate their data to compile EGSS data. This approach may require conducting special EGSS surveys to collect data (on the turnover or output in environmental products) or construct specific registers based on other types of information (e.g. yellow pages, sector specific lists, etc.). The data could also be combined at a later stage with already existing registers, databases and statistics. Such an approach may be called **bottom-up approach**.
- *Meso data* and *macro data* (i.e. aggregated data for groups of producers or for groups of products) from existing statistical data sources can also be used. Such an approach may be

⁽³⁵⁾ 'Non-environmental products' here, as well as in sections 3.1.3 and 3.1.4 actually means 'products outside the EGSS boundary. EGSS includes cleaner and resource efficient products, which may be non-characteristic environmental products.'

called **top-down approach** or **integrative approach** as it generally needs to identify the environmental share of a broader activity or product group. It then integrates data from different sources (e.g. structural business statistics, statistics on the production of manufactured goods, agricultural and energy statistics, and national accounts).

Once the relevant population of EGSS producers (at micro level) or the relevant aggregates from existing statistical sources (at meso and macro level) have been identified, the next step is generally to ensure that non-environmental products and activities are not part of the data set. In both approaches it is therefore necessary to make additional efforts in order to identify the environmental shares. The bottom-up approach does therefore not automatically deliver better quality results than the top-down approach.

Even if compilers successfully establish the complete, relevant EGSS population, much effort may be needed to calculate the environmental shares of the population members. Special EGSS surveys may be conducted for this purpose. Such surveys can be a unique source of specialised information but they can be time-consuming, costly and burdensome for the respondents and may not always deliver good quality results. To maintain sufficient quality, detail and coverage of the EGSS accounts while reducing the cost of statistical production and the burden to survey respondents, special EGSS surveys may be carried out with multi-annual frequency and be combined with a top-down approach based on data with annual frequency. For example, in some areas (e.g. production and installation of equipment for renewable energy production) producers may be surveyed only every second to fifth year and in between the survey data could be projected by combining them with an integration approach (e.g. using aggregate data on capacity changes and investments for renewable energies and data on the production of manufactured goods).

Various variants of the two main approaches may coexist in the compilation practice reflecting country specific data availability. Traditions in the NSIs, availability of human resources, national priorities etc. may matter in the choice of the methods, too. In practice countries may choose a top-down approach which is supplemented by a bottom-up approach in certain areas where it is particularly difficult to base EGSS estimates on already existing data (e.g. for some manufacturing industries and specific services such as environmental consulting and energetic refurbishment of houses).

Moreover, some parts of the EGSS accounts may be compiled using micro data and others using meso and macro data. It is also possible to combine approaches based on the top-down approach with data at the micro level (e.g. from special EGSS surveys) to determine the EGSS share within a broader aggregate. Useful data for the compilation of EGSS accounts may also come from industry associations, ministries or government agencies.

Both approaches may also use the same type of source; the main difference is that the bottom-up approach uses directly micro data (e.g. the responses of the units surveyed for the SBS) whereas the top-down approach uses data already aggregated (e.g. total output by NACE classes from the SBS). By making the best use of already existing statistical data combined with modelling techniques sufficiently exhaustive estimates at relatively low compilation costs can be obtained without increasing the statistical burden for data providers (mainly companies).

This handbook does not prescribe the use of one or the other method, but shows how they can be used. Many countries have already established their methods; this chapter also draws from their experience published in various reports on pilot project.⁽³⁶⁾

4.1. Bottom-up (micro data) approach

This section addresses the bottom-up approach using micro data. First, methods for the identification of the population of EGSS producers are described, and, secondly, the main sources from which the necessary micro data can be obtained are discussed.

⁽³⁶⁾ See for example the catalogue of pilot study reports: <http://ec.europa.eu/eurostat/web/environment/overview>

4.1.1. Identifying the population of EGSS producers

This section draws on the experience of some countries to identify the population of the EGSS and build a database of EGSS producers for collecting EGSS data.

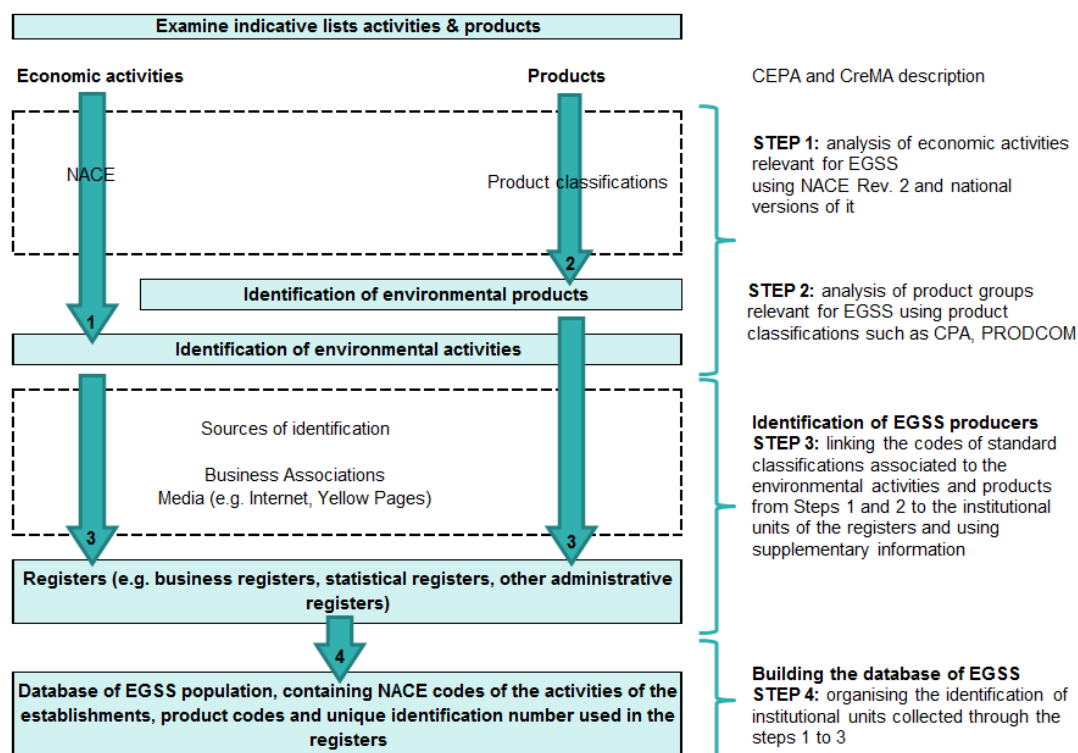
Four steps may be distinguished to identify EGSS producers and create micro databases for the EGSS:

- Analysis of economic activities;
- Analysis of products;
- Identification of EGSS producers;
- Construction of the EGSS database.

This approach is illustrated in Figure 4 and explained next.

It is noted that some countries may not need an analysis of economic activities *and* products. They may have an approach based only on activities *or* products. Therefore the explanations below are indicative and may be adjusted to the national situation.

Figure 4: Steps to identify the EGSS population



STEP 1: ANALYSIS OF ECONOMIC ACTIVITIES

Starting points for the analysis of the economic activities are the list of economic activities in the indicative compendium (see Annex 1) and the operational list of EGSS activities, whose use has been described in section 2.2. EGSS compilers should identify those activities of the list which are not relevant at national level to exclude such activities, whereas they may add other activities not in the list but which they deem to be important in their case. Thus national compilers can create country specific lists of environmental economic activities.

Certain manufacturing activities may not exist in some countries or be so small that they can be excluded from a country specific list. For example, the manufacturing of wind turbines in the EU is currently concentrated on a few countries, whereas for many countries this production does not exist. However, country specific lists should be reviewed regularly for completeness which requires a thorough analysis of business and production statistics and some observation of the relevant markets: In particular the activities of internationally operating manufacturers should be closely observed as they tend to set-up new production facilities outside their home country.

Countries can include in their EGSS accounts nationally relevant environmental activities and products that are not in the compendium as some activities and products not listed in the compendium may be important in certain countries. For example, the production of liquid nitrogen or liquid air operated engines for chillers in refrigerator vehicles may become an important EGSS activity in future as diesel operated chiller engines (currently most widely used) emit too much carbon particles and nitrogen oxides.⁽³⁷⁾ Based on the NACE classification those classes of economic activities that correspond closely to environmental economic activities or may consist to a significant extent of those should be identified. This examination should rely on the explanatory notes for the NACE classes (Eurostat, 2008) and explanations provided in RAMON.⁽³⁸⁾

Some labels in the NACE classification clearly refer to environmental activities. These activities comprise e.g. NACE divisions 37 (sewerage), 38 (waste collection, treatment and disposal activities, materials recovery) and 39 (remediation activities and other waste management). As such they can normally be all extracted from the statistical business register. The principal output of producer units in these divisions should be environmental products. These units may therefore be considered as almost entirely belonging to the EGSS. They may, however, also produce some non-environmental products as their secondary activities.

For other NACE divisions the identification of environmental activities is not so straightforward. For example, division 71 also includes some environmental activity. Its class 71.11 (Architectural activities) can include planning activities for energetic refurbishment of buildings, environmental aspects of city planning and landscape architecture. The class 71.12 (Engineering activities and related technical consultancy) includes water management projects and may include other engineering activities that have an EP or RM purpose. Class 71.20 (Technical testing and analysis) includes, amongst other activities acoustics and vibration testing and testing and measuring of environmental indicators such as air and water pollution. The explanatory notes for NACE 71 give important hints that we may find some important environmental activity and that it may be worth to collect additional information (e.g. through surveys and media research) on its producers in order to identify those that produce environmental products or to measure directly the share of environmental products in the output of this division and its classes. However, most output of the industry NACE 71 may be non-environmental products. Without additional information it would be impossible to identify the environmental producers within this division.

Similar arguments hold for NACE 72 and 74:

- NACE 72.1 (Research and experimental development of natural sciences and engineering) may include activities whose main purpose is EP or RM;
- Within NACE division 74 we may also find some environmental activities. For example, environmental consulting falls under NACE class 74.90 (Other professional, scientific and technical activities).

Another example is the production of renewable energy. Production of renewable energy is an environmental activity and renewable energy is a 'cleaner and resource efficient product'. The producers of renewable energy are mainly classified within NACE class 35.11 (Production of electricity), which includes the producers of electric energy from renewable sources together with producers of electricity from non-renewable sources (nuclear, gas turbine, coal, etc.). Production of equipment to produce electricity from renewable sources is classified in divisions 26 and 28: solar cells and solar modules used for directly transforming solar power into electricity in class 26.11

⁽³⁷⁾ Süddeutsche Zeitung: Grüner kühlen, 2 December 2015, Nr. 278, p. 26

⁽³⁸⁾ http://ec.europa.eu/eurostat/ramon/index.cfm?TargetUrl=DSP_PUB_WELC

(Manufacture of electronic components) together with the production of other electronic components such as microprocessors and USB cables; hydraulic and wind turbines in class 28.11 (Manufacture of engines and turbines, except aircraft, vehicle and cycle engines) together with other engines such as marine and railway engines, and solar collectors used for direct heating of water via a water exchanger in class 28.21 together with ovens, furnaces and furnace burners.

A further example is insulation works: thermal, sound and vibration insulation is classified in the class 43.29 (Other construction installation) together with the installation of elevators.

For other NACE divisions and classes it can be less obvious - given the description of their composition - whether they include producers of environmental products or not. In principle each class may include some producers that produce environmental goods or services either as their principal output or as their secondary output. However, using the classification of economic activities we may identify divisions and classes where the major part of gross value added is due to the production of environmental products (e.g. NACE 37, 38 and 39 ⁽³⁹⁾) or where (depending on the country) production of environmental products is potentially significant (e.g. NACE 26.11, 28.11, 35.11, 43.20, 71.11, 71.12, 71.20, 72.1, 74.90).

National versions of NACE may have a more detailed classification of activities, which may allow disclosing more environmental activities. If data are collected using more detailed classifications, the identification of environmental producers will be more focused. Two examples for such more detailed industrial classifications are shown below:

- The Norwegian Standard Industrial Classification 2007 ⁽⁴⁰⁾ has some extensions to five-digit sub-class level containing activities which are entirely environmental. Norway has split NACE 35.11 (Production of electricity) into sub-groups with some of them relevant as renewable energies: 35.111 (Production of electricity from water power), 35.112 (Production of electricity from wind power) and 35.113 (Production of electricity from biofuel);
- In France insulation works (sound, thermal and vibration) are isolated under the sub-class 43.29A⁽⁴¹⁾, whereas other installation works are classified in 43.29B. In 2011 more than 3000 enterprises were recorded under 43.29B⁽⁴²⁾. These are enterprises whose principal activity is insulation works. However, it is unlikely that the SBS data for NACE 43.29A provide an exhaustive estimate of the output and employment for insulation works as companies recorded under other classes of the division 43 (Specialised construction activities) or in division 41 (Construction of buildings) may carry out such work as a secondary activity.

The industrial classifications can be combined with lists of environmental activities. The indicative compendium and Eurostat's operational list of EGSS activities give guidance on the economic activities and NACE categories to be covered by the EGSS accounts. The identification of EGSS relevant activities based on the NACE Rev.2 descriptions has, however, some limitations:

- NACE has 615 classes to classify all the productive economic units in the economy. Single classes can group together producers of many different products of which some are environmental and others not.
- One NACE code is assigned to each unit in the national statistical business registers, according to its principal economic activity. The principal activity is the activity which contributes most to the gross value added of the unit. Some producers of environmental products, when they execute an environmental activity as secondary activity may be classified in NACE divisions and classes that are not identified as ones with the major part of their gross value added arising from the production of environmental products or ones with potentially significant production of environmental products. For example, NACE division 36 is clearly not a typical environmental activity as a major part of it consists in collecting, treating and supply of drinking water. However,

⁽³⁹⁾ The share of NACE divisions 37-39 in total EGSS output at European level is between 20% and 40% according to Eurostat estimates

⁽⁴⁰⁾ Statistics Norway: Standard Industrial Classification 2007, <http://stabas.ssb.no/ItemsFrames.asp?ID=8118001&Language=en>

⁽⁴¹⁾ Institut national de la statistique et des études économiques: Nomenclature d'activités française - NAF rév. 2, 2008 (édition 2015), <http://www.insee.fr/fr/methodes/default.asp?page=nomenclatures/liste-nomenclatures.htm>

⁽⁴²⁾ Institut national de la statistique et des études économiques: Résultats sectoriels 2011 : Travaux d'isolation (4329A), http://www.insee.fr/fr/themes/detail.asp?reg_id=0&ref_id=esa-construction-2011&page=donnees-detaillees/esa/esa-construction/esa-construction-2011/fiche4329A.html

in some countries producers pertaining to NACE 36 may execute sewerage as a significant secondary activity, which clearly is an environmental activity. EGSS compilers must make sure that such significant activities are captured in the EGSS accounts;

- Environmental activities executed as ancillary activities cannot be identified using the NACE description of activity;
- The classification of units belonging to the general government is in practice often less detailed than for businesses units. It may occur that local government departments are classified, with their parent institutional unit, in NACE 84.11 (General public administration activities) even if they mainly execute environmental activities such as wastewater and waste collection and treatment.

To sum up, this first step of using the classification of economic activities down to the level of classes may help identifying some environmental activities, but will in most cases need further investigations. Environmental producers under the relevant classes of economic activities may in some cases be found by analysing specialized environmental businesses registers like environmental business organizations' registers. For example, in the case of organic farmers, lists of producers can usually be obtained from organic farming associations or certification bodies.

STEP 2: ANALYSIS OF PRODUCTS

EGSS data must be reported broken down by activity rather than by product. However an estimation approach by product may be useful and indeed necessary in some countries or for some areas. If data on products are used to estimate the characteristics of the EGSS the data must be transposed from a product perspective into an economic activity perspective.

A starting point for the analysis of products is the list of environmental goods and services in the indicative compendium (Annex 1) and the operational list of EGSS products, whose use has been described in section 2.2. This list covers the core products found relevant for EGSS accounts and important in most European countries. Starting with this list countries should identify those products of the list which are not relevant for them to exclude them, whereas they may add other products not in the list but which they deem to be important in their case. By such exclusions and inclusions the countries can create country specific lists of environmental products.

Certain products (e.g. fuel wood) in some countries may not be produced or marketed in significant amounts so that they can be excluded from a country specific list. However, country specific lists should be reviewed regularly for completeness which requires a thorough analysis of business and production statistics and observation of the relevant markets and of the R&D sector.

It may happen that a product is already standard in one country, whereas it is still cleaner and resource efficient in another country. When a former cleaner and resource efficient product becomes a normal product, it would not belong anymore to the list of environmental products. However, it is not really helpful for the interpretation of EU-wide accounts that for a specific reference year the same product would qualify as cleaner and resource efficient in one country and not qualify as such in another country. To ensure a minimum of harmonisation the Eurostat's EGSS list of environmental goods and services also covers products that are considered as belonging to the category of cleaner and resource efficient products.

Product classifications are generally used to identify environmental products on the basis of their labels. However, similarly to the analysis of activities (see above) a general limitation of using product classifications is that product groups relevant for EGSS may include (even at the most detailed level) products which are not environmental.

An additional element in the analysis by products, which has no equivalent in the analysis by activities, is that the existing sources use several classifications of products (CPA, CN, etc.) whereas for an analysis by activities normally all sources use the same classification (NACE). This means that the analysis by product may need to be performed separately for each product classification.

- Table 6 shows examples of product groups of the CPA 2008 that can be assumed to be entirely environmental products;

- Going into more detail than CPA, the PRODCOM can allow for the identification of EP and RM output which is not singled out by CPA codes. For example, multiple walled insulating units of glass, which is glass used for windows that help saving heat or reducing noise, are identified by PRODCOM 23.12.13.30 (whereas CPA 23.12.12 also includes glass mirrors). Some more examples for PRODCOM codes relevant for EGSS are shown in Table 7. Services are, however, not covered by PRODCOM. The link to CPA enables national statistical institutes to use the business register to identify the enterprises likely to be manufacturing the product;
- The codes of the CN can be useful for the estimation of trade in environmental goods. However, there are only a limited number of product codes that directly identify environmental goods. Some examples of trade codes from the CN 2013 version that relate to environmental goods are shown in Table 8. Some of these trade codes may be regarded as representing groups of goods that are almost entirely environmental goods (e.g. generating sets, wind powered – CN 8502.31.00), others may cover groups of products that are not entirely environmental (e.g. machinery and apparatus for filtering or purifying air excl. isotope separators and intake air filters for internal combustion engines - CN 8421.39.20). As external trade statistics are more disaggregated than PRODCOM they may allow identifying new potentially environmental products and then, through trade registers or correspondence between CN and PRODCOM, select the units that produce these products.

Table 6: Examples of CPA 2008 codes that are 100% environmental products

CPA 2008	Description
02.20.14	Fuel wood
08.12.13	Mixtures of slag and similar industrial waste products, whether or not incorporating pebbles, gravel, shingle and flint for construction use
22.19.10	Reclaimed rubber in primary forms or in plates, sheets or strip
23.65.11	Boards, blocks and similar articles of vegetable fibre, straw or wood waste, agglomerated with mineral binders
26.51.41	Instruments and apparatus for measuring or detecting ionising radiations
28.11.22	Hydraulic turbines and water wheels
28.11.24	Wind turbines
28.11.32	Parts of hydraulic turbines, water wheels including regulators
37	Sewerage services; sewage sludge
38	Waste collection, treatment and disposal services; materials recovery services
39	Remediation services and other waste management services
43.29.11	Insulation works
71.12.15	Engineering services for waste management projects (hazardous and non-hazardous)
74.90.13	Environmental consulting services

Source: Eurostat, RAMON

Table 7: Examples of PRODCOM 2015 codes relevant for EGSS(*)

PRODCOM	Description
20.14.74.00	Un-denatured ethyl alcohol of an alcoholic strength by volume ≥ 80 %
20.14.75.00	Denatured ethyl alcohol and other denatured spirits; of any strength
20.59.59.97	Biofuels (diesel substitute)
23.12.13.30	Multiple-walled insulating units of glass
23.99.19.10	Slag wool, rock wool a. similar mineral wools and mixtures thereof, in bulk, sheets or rolls
23.99.19.30	Mixtures and articles of heat/sound-insulating materials n.e.c.
26.11.22.40	Photosensitive semiconductor devices; solar cells, photo-diodes, photo-transistors, etc.
26.51.53.13	Electronic gas or smoke analysers
28.25.13.80	Heat pumps other than air conditioning machines
28.25.14.40	Machinery a. apparatus for filtering or purifying gases by catalytic process (excl. intake air filters for internal combustion engines, machinery a. apparatus for filtering or purifying air)
33.20.29.10	Installation of engines and turbines (excluding aircraft, vehicle and cycle engines)

(*) Also PRODCOM codes corresponding to the 6-digit CPA codes of Table 6 are relevant
Source: Eurostat, RAMON

Table 8: Examples of CN 2016 trade codes relevant for environmental goods

CEPA/CRReMA		Description	CN 2016
CEPA 1	Protection of ambient air and climate	Machinery a. apparatus f. filtering or purifying air (excl. isotope separators and intake air filters for internal combustion engines)	8421.39.20
		Machinery and apparatus for filtering or purifying gases other than air by a catalytic process (excl. isotope separators)	8421.39.60
		Machinery and apparatus for filtering and purifying gases other than air (excl. those which operate using a catalytic process, and isotope separators)	8421.39.80
		Parts of machinery and apparatus for filtering or purifying liquids or gases, n.e.c.	8421.99.00
		Electronic gas or smoke analysis apparatus	9027.10.10
		Non-electronic gas or smoke analysis apparatus	9027.10.90
CEPA 2	Wastewater management	Activated carbon (excl. medicaments or deodorant products for fridges, vehicles etc., put up for retail sale)	3802.10.00
		Submersible pumps, single-stage	8413.70.21
		Machinery and apparatus for filtering or purifying liquids (excl. such machinery and apparatus for water and other beverages, oil or petrol-filters for internal combustion engines)	8421.29.00
CEPA 3	Waste disposal	Panels, boards, tiles, blocks and similar articles of vegetable fibre, of straw or of shavings, chips, particles, sawdust or other waste of wood, agglomerated with cement, plaster or other mineral binders	6808.00.00
		Industrial or laboratory furnaces, incl. incinerators, non-electric (excl. for the roasting, melting or other heat treatment of ores, pyrites or metals, bakery ovens, ovens and furnaces for firing ceramic products, ovens and furnaces for firing cement, glass or chemical products)	8417.80.70
		Parts of industrial or laboratory furnaces, non-electric, incl. incinerators, n.e.c.	8417.90.00
CEPA 7	Protection against radiation	Instruments and apparatus for measuring or detecting ionising radiations	9030.10.00
CRReMA 11	Management of forest resources	Pulps of fibres derived from recovered waste and scrap paper or paperboard	4706.20.00
CRReMA 13	Management of energy resources	Undenatured ethyl alcohol of an alcoholic strength by volume of 80 % vol or higher; ethyl alcohol and other spirits, denatured, of any strength	2207
		Biodiesel and mixtures thereof, not containing or containing less than 70 % by weight of petroleum oils or oils obtained from bituminous minerals	3826
		Natural rubber latex, whether or not prevulcanised	4001.10.00
		Reclaimed rubber in primary forms or in plates, sheets or strip	4003.00.00
		Fuel wood, in logs, in billets, in twigs, in faggots or in similar forms; wood in chips or particles; sawdust and wood waste and scrap, whether or not agglomerated in logs, briquettes, pellets or similar forms	4401
		Wood charcoal (including shell or nut charcoal), whether or not agglomerated	4402
		Slag-wool, rock-wool and similar mineral wools; exfoliated vermiculite, expanded clays, foamed slag and similar expanded mineral materials; mixtures and articles of heat-insulating, sound-insulating or sound absorbing mineral materials (other than headings 8611 and 6812 and those of Chapter 69)	6806
		Multiple-walled insulating glass consisting of two panels of glass sealed around the edges by an airtight joint and separated by a layer of air, other gases or vacuum	7008.00.81
		Multiple-walled insulating glass: other	7008.00.89
		Panels comprising two walls of profiled (ribbed) sheet with an insulating core	7308.90.51
		Hydraulic turbines, water wheels, and regulators therefor	8410
		Heat pumps other than air conditioning machines of heading 8415)	8418.61.00
		Generating sets, wind-powered	8502.31.00
		Photosensitive semiconductor devices, including photovoltaic cells whether or not assembled in modules or made up into panels; light-emitting diodes	8541.4
CRReMA 14	Management of minerals	Macadam of slag, dross or similar industrial waste, whether or not incorporating the materials cited in subheading 2517 10	2517.20.00

Source: Eurostat, RAMON

The operational list of environmental products provide information under which CPA and CN codes environmental products can be identified and to which class of the classifications of environmental activities (CEPA/CRéMA) they may belong. For example, scrubbers are produced in order to treat and correct air emissions at the end of the generation process. In the Eurostat list they are covered under CPA 28.25.14 which includes machinery and apparatus for filtering or purifying air and gases and it is indicated that this product falls under CEPA 1. The corresponding CN codes are 8421.39.20, 8421.39.60 and 8421.39.80.

Using the CPA classification structure and explanatory notes allows identifying also those environmental products that are not covered by PRODCOM, in particular services (including construction). For example, the 'construction of water treatment and sewage disposal plants' is classified under CPA 42.21.23. Other examples are CPA 71.11.31 'urban planning services' which includes, among others, studies of the environmental impact of urban development plans and CPA 71.12.15 'engineering services for waste management projects' or CPA 71.12.16 'Engineering services for water, sewerage and drainage projects'.

Some countries have more detailed classifications of products. For example, the French products classification (Prodfrac) has ten digits and separate positions exist for environmental products.⁽⁴³⁾ For example, industrial ovens for waste incineration (Prodfrac 28.21.12.70.10) are a sub-position of PRODCOM 28.21.12.70 (Industrial or laboratory furnaces and ovens, non-electric, including incinerators).

Except for very rare products, 'cleaner and resource efficient products'⁽⁴⁴⁾ are normally not identified in products classifications. More detailed classifications than PRODCOM can, however, be relevant for this product category. For example, France added specific sub-positions for condensing boilers (Prodfrac 25.21.12.00.10 and 25.21.12.00.50) below the position 'Boilers for central heating other than those of HS 8402' (PRODCOM 25.21.12.00).

Box 7: Identifying cleaner and resource efficient products

The following approach may be tested to identify further cleaner and resource efficient products,:

- Select groups of goods with the greatest negative environmental impacts during their production, use or scrapping;
- Examine for each group the most relevant goods with the relatively best environmental performance levels, on the basis of objective parameters such as energy consumption and efficiency, recyclability/bio-degradability, low/zero pollution using the available data at national level;
- Measure 'leading market edges' for each good and estimate the part which is considered as the 'leading green edge' of the market, based on current standards;
- Identify which of these leading green goods are produced in the country and identify the codes of the standard classifications where the identified goods are currently classified.

To sum up: this second step can draw on already existing lists of environmental products, which may be further extended. It is possible to organise such lists using classifications of products and to identify corresponding NACE codes. However, the products grouped together under a position are rarely homogeneous even at detailed level of the classifications so that one group may include environmental products as well as non-environmental products. This may require further adjustments or corrections.

⁽⁴³⁾ See for example : Institut national de la statistique et des études économiques: Résultats 2013 au niveau PRODFRA, http://www.insee.fr/fr/themes/detail.asp?reg_id=0&ref_id=eap_2013

⁽⁴⁴⁾ See definition in section 1.2.1

STEP 3: IDENTIFICATION OF EGSS PRODUCERS

Once the lists of environmental activities and products have been drawn and the relevant codes of economic activity and product classifications are identified for each of them, the next step is to identify the corresponding producers. This can be done using statistical and administrative sources, such as surveys for SBS and for industrial production statistics, databases of the tax, social security and labour market administrations, and business and statistical registers (see also Box 8), which play an important role. Also the Labour Force Surveys (LFS) may be helpful in the identification to some extent.⁽⁴⁵⁾

The identification of producers can be carried out very efficiently if the various surveys, registers and other sources use identical identification numbers (IDs) for the producer units or if a correspondence of the producer IDs of the various sources can be established. The population of producers thus established may need further refinement in cases where the non-environmental production by these producers is significant (see example in Box 8). The identification must therefore be complemented with other sources of information about the producers, such as from the media, internet information, lists and registers of industry associations, environmental trade shows and fairs, yellow pages, etc., looking for environmental activities, products and producers. Also special EGSS surveys may be carried out for certain NACE classes as to identify their environmental producers. 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 significantly contributing to EGSS and would therefore not be surveyed. The operational list of EGSS activities (see section 2.2) is a good starting point for this selection as it establishes a link between the economic activities in the indicative compendium and the NACE classification.

Box 8: Statistical business registers

Statistical 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 out 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 can be 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.

⁽⁴⁵⁾ LFS is a survey to persons or to households. Respondents of this survey must report the NACE of LKAU where they work but frequently they confuse with the NACE of their employer i.e. company. In Nordic countries the employer is identified from micro-linking with employment registers and from there the NACE code and other LFS variables are filled

STEP 4: CONSTRUCTION OF EGSS DATABASE

The result of the previous three steps can be put together in a detailed database of the (potential) population of the EGSS which contains codes of activities and products and also the IDs of the producers. Such a database will mainly include market producers, whereas it is less likely that it will contain a significant number of non-market producers (unless they are registered and covered by the sources used).

4.1.2. Data sources for the bottom-up approach

The main data sources for the bottom-up approach are existing surveys, e.g. those conducted to establish the time series of the SBS, PRODCOM-statistics and the Labour Force Survey. The definitions of variables in these sources are already quite close to the definitions of the characteristics of EGSS accounts (e.g. turnover in SBS as a proxy for market output). Also business registers and administrative sources such as databases of the tax board, social security and labour market administrations may provide useful information on the activity or products produced by individual producers (whether being part of EGSS or not), in particular when the administrative information can be linked to the statistical sources through common identification codes. The information may be supplemented by research in media (e.g. internet, professional journals) or from trade fairs. Once a database of a population of EGSS producers is available, special EGSS surveys may be carried out to obtain more detailed information on the producers, in particular, to determine the shares of EP and RM output and employment out of their total output and employment.

STRUCTURAL BUSINESS STATISTICS

Structural Business Statistics (SBS) covers all activities of enterprises for sections B to N and division S95 of NACE Rev.2. The two SBS variables of interest for the compilation of EGSS market output are annual turnover and the production value. These variables are available at NACE class level (four digits). The SBS also collects data on the gross value added and on input related variables (number of employees, personnel costs and gross fixed capital formation), which can be useful for the compilation of EGSS accounts.

There are, however, conceptual differences between SBS and national accounts (NA). This is illustrated with a numerical example in Table 9 which compares the data from SBS and NA for the NACE divisions 37-39.

Table 9: Comparison of SBS and national accounts data for NACE 37-39, year 2010 (in million EUR)

	SBS	National accounts supply tables		
	Production value	Output (P1)	of which non-market output (P13)	P1 less P13
Germany (1)	35 000	41 469	0	41 469
France	23 511	26 412	0	26 412
Hungary	1 074	1 294	126	1 168
Netherlands	7 105	7 117	78	7 039
Austria (2)	3 203	5 908	0	5 908
Poland	4 844	6 013	372	5 641
Portugal	1 553	2 702	192	2 510
Slovakia	486	560	27	533
Sweden	3 818	3 846	0	3 846
United Kingdom	21 522	31 022	7 245	23 777
Norway	2 520	3 927	0	3 927

(¹) turnover instead of production value for Germany

(²) 2011 data for Austria

Source: Eurostat (online data codes sbs_na_ind_r2 (extracted on 04/09/2015) and naio_10_cp15 (extracted on 17/08/2015))

Figures for NA output in NACE 37-39 are generally bigger than the production value in SBS even after adjusting the national accounts figures for non-market output. The reasons for these differences can be manifold:

- SBS uses the enterprise as statistical unit⁽⁴⁶⁾, and the production value measures the amount actually produced by the unit, based on sales, including changes in stocks and the resale of goods and services (see also Box 5 in section 3.1.1). The SBS production value is therefore a concept closely related with market output and output for own final use (except for products retained for own final consumption). In NA the statistical unit for the output measurement is, however, the establishment (LKAU), and output also covers non-market output.
- To make the data from the two sources more comparable we can deduct the part of non-market output from NA output figures. Even after this deduction for most countries the output data (P1 less P13) of national accounts are bigger than the production value in SBS. One possible reason for this is that in NA deliveries between LKAUs of the same institutional unit are included in the output measure (see ESA 2010, § 3.14).
- In NA some institutional units within the general government sector or the sector of non-profit institutions serving households may have establishments that are market producers or produce market output as a secondary activity (see ESA 2010, §§ 3.39-3.40). Market output by the general government sector may not be fully covered by SBS.

As explained in section 3.1.1, the use of SBS for EGSS accounts would require adjustments to meet the definition and valuation principles for market output. In particular it is recommended to adjust turnover (e.g. adding subsidies on products and subtracting taxes on products) whenever taxes and subsidies may constitute a significant part of the EGSS output value and the sources to estimate them were available. From a conceptual point of view the SBS production value might be preferred to SBS turnover as a better approximation for market output. However, even when using the SBS production value, some adjustments could be necessary to come conceptually closer to the market output definition of the EGSS accounts (e.g. excluding capitalised production and adding subsidies on products).

More important than those conceptual differences is the fact that SBS provides little indication on the share of environmental output in turnover and production value. Only for very few NACE divisions or classes we can assume that they consist almost entirely of environmental activities (e.g. NACE 37-39).

However, even for NACE divisions which can be assumed to almost entirely represent EGSS (e.g. NACE 37-39), SBS may not fully cover EGSS market output. Complementary information is necessary to estimate the share of EGSS in other industries. In the following we examine the PRODCOM-statistics as a possible source for this.

PRODCOM

The main difference between SBS and PRODCOM is that SBS relate to economic activities (e.g. the activity of the producers) whereas PRODCOM relate to products (e.g. the output delivered by the producers).

PRODCOM statistics (PRODUCTION COMMUNAUTAIRE) provide data on the physical volume of production and the monetary value of the production of manufactured goods from NACE sections B (Mining and quarrying) and C (Manufacturing) sold during the survey period. The National Statistical Institutes conduct surveys on enterprises to collect the data using the PRODCOM lists of products. Data on the value of the production sold is published.

⁽⁴⁶⁾ The enterprise is the smallest combination of legal units that is an organizational unit producing goods or services, which benefits from a certain degree of autonomy in decision-making, especially for the allocation of its current resources. An enterprise carries out one or more activities at one or more locations. An enterprise may be a sole legal unit (Council Regulation (EEC) No 696/93 of 15 March 1993 on the statistical units for the observation and analysis of the production system in the Community)

Table 10: Example of PRODCOM data, sold production (in million EUR)

PRODCOM code and label	Country	2010	2011	2012
28.11.24.00	France	:	:	:
Generating sets, wind-powered	Denmark	2 958	3 460	4 586
	Germany	1 662	1 910	2 743
26.51.53.13	France	41	78	76
Electronic gas or smoke analysers	Denmark	3	3	2
	Germany	146	167	164
28.25.14.40				
Machinery and apparatus for filtering or purifying gases by catalytic process (excluding intake air filters for internal combustion engines, machinery and apparatus for filtering or purifying air)	France	0	0	:
	Denmark	0	0	0
	Germany	1 153	1 470	1 609
26.11.22.40				
Photosensitive semiconductor devices; solar cells, photo-diodes, photo-transistors, etc.	France	335	275	:
	Denmark	13	18	31
	Germany	4 603	4 003	2 057

Source: Eurostat (online datacode DS-066341); extracted on 16/09/2015

The use of the PRODCOM variable 'value of production sold' as a proxy for market output has already been discussed earlier and conceptual differences were identified (see Box 5).

Besides conceptual differences with the market output concept of EGSS accounts, PRODCOM can have a limited coverage of units. The PRODCOM Regulation⁽⁴⁷⁾ does not require to survey enterprises with less than 20 employees. Using sold production as an approximation for EGSS market output can result in underestimation due to enterprises not covered.

As a conclusion PRODCOM can be used to estimate EGSS market output for product positions that are (almost) entirely environmental goods (such as wind powered generating sets). There can be other PRODCOM positions that may include certain shares of environmental products. To identify these shares the PRODCOM statistics can be combined with supplementary information such as extended lists of environmental products and EGSS surveys.

EGSS SURVEYS

Specific EGSS surveys are useful to provide comprehensive information. However, they can also be time-consuming and resource intensive, both for respondents and national statistical institutes.

Specific EGSS surveys of environmental goods and services enterprises can collect detailed information covering the most relevant economic variables (output, exports, employment and gross value added) broken down by economic and environmental activities.

One example of specific survey comes from the United Kingdom (2013). The survey collects the shares of environmental product in total production or turnover.

Box 9: ONS approach to estimate EGS characteristics

The EGSS activities 'Energy saving and sustainable energy systems', 'Environmental consultancy and engineering services', 'Environmental related construction activities', 'Production of industrial environmental equipment' and 'Environmental inspection and control' are spread across a wide variety of SIC codes and are therefore not easily identifiable in data sources such as the national

⁽⁴⁷⁾ Council Regulation (EEC) No 3924/91

accounts. A new two-part question on the environmental goods and service sector (EGSS) was added to the 2013 Annual Business Survey (ABS) questionnaire, in order to scope out the size of the EGSS sector and to provide initial monetary estimates for these five specific EGSS activities.

Environmental goods and services sector (EGSS) question in the 2013 annual business survey

3.3 ENVIRONMENTAL TURNOVER

- (a) Did your business produce a good or service with the main aim of protecting the environment?

Yes ☒ → Go to question 3.3 (b)

No ☒ → Go to question 4 80

- (b) Please estimate the proportion of your total turnover that relates to the environmental good or service produced.

Please ☒ one box only

0 - 24%



25 - 49%



50 - 100%



81

The response rate at the time of collection of a total of 73,053 was 75.3% with 1,994 businesses responding 'Yes' to the EGSS question. To ascertain and assure quality of the responses, each business that responded 'Yes' to the EGSS question was validated, whenever possible, through the identification of a website or alternatively through their SIC, from trade associations registers or business directories. After validation, 46.0% (918 businesses) of those that answered 'Yes' were confirmed to be participating in the EGSS and an additional 3.6% (72 businesses) could not be determined as they had no website or no additional information could be found to help identify their participation in the EGSS. Each business' EGSS activity was identified and allocated to CEPA and/or CReMA category and an EGSS activity category. In cases where there was no additional information, their responses were imputed based on those businesses already allocated, using propensity score matching (nearest neighbour analysis). Of the imputed businesses 32 were deemed to be undertaking EGSS activities. After imputation, a total of 950 businesses (2.0% of all businesses in the sample) were identified as producing Environmental goods and services (EGS).

Output and aGVA¹ for these businesses were derived from ABS variables and FTE from the IDBR (Inter-Departmental Business Register). The median value collected from part b of the EGSS question was used to calculate the turnover of each company resulting from EGS. In turn, this was used to calculate aGVA, and data from the IDBR was used to measure employment resulting from EGS. The sample was used to estimate totals for the whole population, taking into account non-responses using the appropriate statistical weights.

Estimates of EGSS output, GVA and employment between 2010 and 2012 were back-casted from the 2013 ABS data based on a business' turnover in these years. It was assumed that if the business existed during 2010 to 2012, the proportion of EGSS turnover to total turnover was the same as in 2013.

Each year, the businesses identified as being involved in EGSS activity will be added to an EGSS database to formulate a register which will be used to improve estimates. The EGSS question that appears in the 2014 ABS questionnaire (dispatched in February 2015) has been modified slightly to improve the quality of the responses.

¹ aGVA is the Approximate Gross Value Added (aGVA) is a measure produced by the Annual Business Survey (ABS), outside of the National Accounts framework. It can be used as an approximation to GVA, or in its own right as a measure of business performance.

Source: <https://www.ons.gov.uk/economy/environmentalaccounts/bulletins/ukenvironmentalaccounts/2015-04-15#sources-reports-and-surveys-related-to-uk-environmental-goods-and-services-sector-egss-2010-2012>

Another example comes from Germany: Destatis conducts an annual survey on EGSS covering the manufacturing, construction and services industries and including the variables turnover, employment and exports (Kleine, 2012; Buchner, 2015). Queries on the business register in combination with information on produced goods from the production statistics are used to identify the enterprises to be surveyed. However, this survey does not satisfy all the data requirements of Regulation No 691/2011 in the area of EGSS as it does not cover all relevant economic activities and characteristics. To increase the coverage Germany developed additional methods for the estimation of environmental shares of goods identified by the PRODCOM statistics; the methods and main results from this interesting approach are summarised in Box 10.

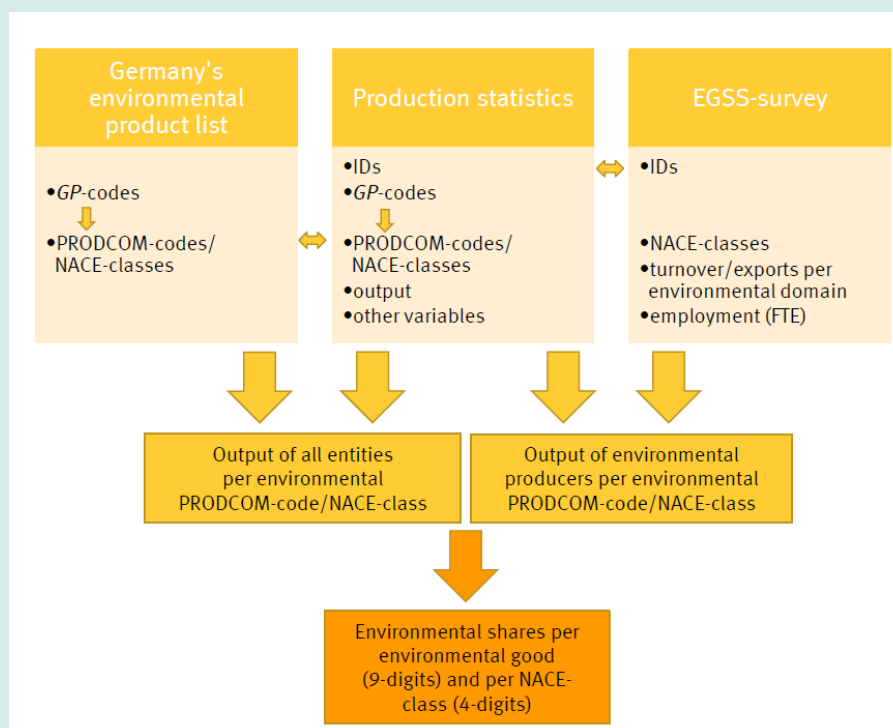
Box 10: DESTATIS approach to estimate environmental shares

Collecting EGSS production data without adjusting for non-environmental activities could greatly overestimate the market output of environmental goods.

DESTATIS has developed, in cooperation with environmental associations and institutes, a catalogue of environmental goods based on the German national commodity classification (GP 9 digits). This catalogue (247 GP codes being potentially environmental goods), was re-coded into 219 PRODCOM 8-digit codes (being potentially environmental goods) and 69 NACE classes (4 digits).

An EGSS survey questionnaire was administered to every producer in one of the potentially environmental GP codes, asking them the turnover in environmental products (domestically or abroad). The results (production of environmental goods) were compared with the general output of the respective environmental PRODCOM codes / NACE class given by production statistics.

Schematic representation of the German approach



The results show that amongst the 219 potentially environmental goods, only 13 goods had an effective environmental share of their total production superior or equal to 90%, according to production statistics. For 58 goods identified as potentially environmental, the effective environmental share was inferior to 10% (NB: these figures refer to the year of the study 2011).

Shares of environmental products in the 219 potentially environmental PRODCOM positions, Germany, 2011 (DESTATIS)

Environmental share	Number of potentially environmental goods
> 90%	13
75 – 90%	12
50 – <75%	27
25 – 50 %	53
10 – 25 %	38
<10 %	58
Other	18
Total	219

One conclusion is that collecting data from production statistics without adjusting for such shares could greatly overestimate the market output of environmental goods.

Source: Buchner (2015)

A compromise approach is to add supplementary questions to already existing surveys. The part of a survey related to EGSS can be sent to all units or to a sub-sample of those units that receive the main survey. The sub-sample survey can be totally integrated in the mother survey or be in a form of a separate leaflet. If the existing survey does not fully meet the requirements of EGSS in the Regulation (EU) No 691/2011, one solution could be to combine the survey with models.

To further increase the coverage of the EGSS accounts Germany has also decided to apply other methods based on already existing data to cover environmental activities and products that are not covered by the EGSS survey and the PRODCOM data (e.g. wastewater and waste management services, organic farming, management of forest resources) and for the estimation of EGSS gross valued added. These methods are similar to the top-down approaches presented in section 4.2.

The main advantage of adding questions to existing surveys is limiting the additional cost for the statistical institutes. Furthermore, it is often simpler to add an extra variable to an existing survey than to launch an entirely new survey.

The main disadvantage of adding questions to existing surveys is that the questionnaire is generally filled by bookkeeping clerks who are not specialists in the production processes and who may not have the necessary information, knowledge or interest to answer the survey or to report accurate EGSS variables. There is a clear risk that lower priority is given to the EGSS part of the survey.

FROM PRODUCTS TO ECONOMIC ACTIVITIES

EGSS data must be reported broken down by activity rather than by product. If data on products are used to estimate the characteristics of the EGSS accounts the data must be transposed from a product perspective into an economic activity perspective. If EGSS output can be identified by combining PRODCOM statistics with register data and EGSS surveys (as described above) it should, however, be possible to identify the producing units through a common ID and therefore assign the environmental product to the NACE of the producing unit.

If it is not possible to assign the environmental products to the NACE divisions of the producing units through the use of IDs common to the sources, an alternative approach for the transposition from products to activities must be found. The correspondence between CPA and NACE and the data of the national accounts supply tables are then the main tools and sources to achieve this transposition:

- A product with a specific CPA code is produced by the industry with the corresponding NACE

code (i.e., as a principal output of a unit classified under this activity) but it may also be produced by producers in other industries (i.e., as secondary output of a unit classified under another activity). The information on principal and secondary output is available in the data underlying the national accounts supply tables, which provide output broken down by CPA products for the economic activities.

- Therefore a pragmatic way to estimate the EGSS output broken down by the NACE of the producers may be to use the repartition given by national accounts supply tables. For example, when supply tables are published at the A*64 aggregation level, output of environmental products within a CPA category may be distributed to the NACE categories, in the same way as the total output of the CPA categories. Unpublished supply tables may be available to EGSS compilers more disaggregated than A*64: if such more detailed information can be used the estimation of environmental activities by NACE breakdown can be improved.
- However, this approach implies a restrictive assumption: the allocation of an environmental product within a CPA division to the economic activities is proportional to the allocation of the whole CPA division to the economic activities.

If no such information on the repartition of products by economic activities is available the last resource is to treat all environmental products produced under one CPA category as output of the principal activity, i.e., the secondary activity is neglected. This assumption is not perfect, however, for many CPA categories it appears that the share of the CPA product produced by the corresponding NACE industry is very often between 80% and 100%, but there are also exceptions in some countries with shares far below 80% (e.g. in Denmark for fabricated metal products and electrical equipment, in Germany for water treatment and supply services, in the Netherlands for wastewater and waste treatment, and in many countries for scientific R&D services). This is at least suggested when looking at the data published in national accounts supply tables (see Table 11).

Table 11: Share of CPA products produced by the corresponding industry, year 2011

	C25 - Fabricated metal products, except machinery and equipment	C26 - Computer, electronic and optical products	C27 - Electrical equipment	C28 - Machinery and equipment n.e.c.	C29 - Motor vehicles, trailers and semi- trailers	C30 - Other transport equipment	C31-32 - Furniture and other manufactur ed goods
Czech Republic	0.86	0.89	0.90	0.86	0.98	0.78	0.92
Denmark	0.75	0.87	0.69	0.61	0.80	0.92	0.93
Germany	0.93	0.89	0.92	0.91	0.97	0.92	0.96
France	0.94	1.00	0.76	0.75	0.96	0.93	0.95
Italy	0.84	0.95	0.85	0.84	0.94	0.92	0.92
The Netherlands	0.89	0.88	0.94	0.94	0.96	0.64	0.89
Austria	0.95	0.83	0.90	0.93	0.99	0.76	0.96
Sweden	1.00	1.00	1.00	1.00	1.00	1.00	1.00

	C33 - Repair and installation services of machinery and equipment	D - Electricity, gas, steam and air conditionin g	E36 - Natural water; water treatment and supply services	E37-39 - Waste water, waste and recovery	F - Constructio ns and constructio n works	M71 - Architectur al and engineerin g services; technical testing and analysis services	M72 - Scientific research and developme nt services
Czech Republic	0.62	0.94	0.85	0.70	0.82	0.87	0.25
Denmark	0.11	0.94	1.00	0.97	1.00	1.00	0.82
Germany	0.72	0.98	0.56	0.93	0.93	0.90	0.28
France	0.75	0.99	0.93	0.90	0.96	0.92	0.73
Italy	0.51	0.91	0.94	0.42	0.92	0.87	0.22
The Netherlands	0.54	0.96	0.94	0.90	0.95	0.82	0.15
Austria	0.58	0.99	0.97	0.86	0.94	0.76	0.23
Sweden	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Source: Eurostat (online datacode naio_10_cp15 Supply table at basic prices incl. transformation into purchasers' prices)

4.2. Top-down approach: using data sources at aggregate levels

This section presents an overview of the main methods and specific sources for the top-down approach using meso and macro data. The main feature of this approach is that it uses data already aggregated representing totals for economic activities, sectors, products or product groups. Important sources for this approach are national accounts broken down by industries, products and sectors, SBS data on turnover and production by industries, PRODCOM data on production sold, data on environmental expenditure, sector specific statistics for energy and agriculture and trade statistics.

The top-down approach aims to determine the part of a product, activity or employment aggregate that is due to the production of environmental products through a suitable combination of existing statistics. For example, national accounts estimate the output of units that produce electricity as their principal activity. To determine the part of electricity output produced from renewable sources (which is part of CReMA 13A) national accounts data can be combined with data from physical energy statistics (MWh produced from renewable and non-renewable sources) and information on the price and costs differences between electricity from renewable and non-renewable sources. The principle

of compiling EGSS accounts from already existing supply and demand side statistics at aggregate level through an integrative approach is developed in the *EGSS Practical Guide* (Eurostat, 2016). The methods proposed in the *Practical Guide* are particularly recommended whenever comprehensive EGSS surveys are not available (e.g. due to resource constraints). Eurostat has tested and used these methods to compile EGSS estimates at EU-28 level for the period 2000 onwards. The EU-28 estimates were produced with those methods because country EGSS data transmitted to Eurostat were not yet sufficiently exhaustive and comparable over time and across countries.

Section 4.2.1 gives an overview of the main sources for the top-down approach. It also introduces data maps for the integration of existing statistical sources providing a pragmatic categorisation of EGSS output. The categories of the data map are not used for reporting EGSS data but form a compilation layer focused around already existing statistics, mainly at the meso and macro aggregation level, usable for EGSS accounts.⁽⁴⁸⁾ A data map should assist EGSS accounts compilers in integrating the sources and thus reaching sufficient coverage of the EGSS characteristics while minimising overlaps and double-counting. Sections 4.2.2 to 4.2.4 present specific examples of the top-down approach for EGSS output, exports, gross value added and employment.

The Eurostat data map and the top-down approach are described in more detail in the *EGSS Practical Guide*.

4.2.1. Use of data sources and data maps

There are two broad groups of sources for compiling EGSS accounts using a top-down approach: supply side sources and demand side sources.

Supply side sources include SBS, PRODCOM statistics and parts of the national accounts (production and income generation accounts, supply tables and employment estimates). Certain elements of the environmental protection expenditure accounts (EPEA) are also supply side source data because they provide information on the production of EP services.

Demand side sources include EPEA and national accounts (data on gross fixed capital formation and use tables).

For some specific areas such as organic farming, forest management and renewable energy the aforementioned sources may be combined with sector statistics (e.g. agricultural, forestry and energy statistics) and data from other satellite accounts (e.g. Economic Accounts for Agriculture, Integrated Environmental and Economic Accounting for Forests).

Other important sources may be trade associations reports, business reports and engineering information.

STANDARD SUPPLY SIDE SOURCES

The use and limits of *SBS and PRODCOM statistics* for the compilation of EGSS accounts have already been explained in section 4.1.2. In principle those sources can also be used for the top-down approach. However, working at aggregate level it is more difficult to determine EGSS shares than at micro level.

National accounts

The national accounts (NA) data are important sources for the top-down approach, in particular the production and generation of income accounts, the supply and use tables and the employment data. The definitions and valuation principles for the characteristics (e.g. output, gross value added, employment) in the NA are the same as in the EGSS accounts. NA apply important conceptual

⁽⁴⁸⁾ The subgroup of the Task Forces on environmental transfers and on RUMEA recommended that a good solution may be to define pragmatic reporting categories where the reporting categories match the main categories in which source data are available (Minutes of the 1-2 March 2012 meeting of the subgroup on environmental activity and expenditure classifications, Working Group Environmental Expenditure Statistics, Meeting of 27 and 28 March 2012)

adjustments to statistical source data to comply with ESA concepts.⁽⁴⁹⁾ NA data on output, gross value added and employment already also include exhaustivity adjustments, for example when the basic statistical source data are limited in scope, do not report on activities in the black economy or do not correct for other types of underreporting. Moreover, NA reconcile inconsistent estimates and generate reliable datasets by using information on production, expenditure and income in the construction of supply and use tables, which balance supply and use at the product level. Using those estimates relieves compilers of EGSS accounts from some of the task of adjusting, combining and balancing the basic sources.

The top-down approach often requires applying shares of environmental activities and products when the industry and product breakdown are not sufficiently detailed to identify the EGSS activities and products. Estimation of shares is possible by combining statistical sources on physical data and prices from sector specific statistics (e.g. for agriculture and energy) with economic data. Estimates of EGSS shares using sector specific statistics data may, however, be less precise than estimates based on micro data (e.g. from specific EGSS surveys) since existing statistical sources are not designed to specifically identify EGSS activities and products.

Whenever possible the estimates based on the top down approach should be supplemented with information from trade associations and business reports to verify the shares of EGSS characteristics within the relevant broader industries.

Engineering information and specialised studies may also help to identify EGSS activities and products. For example, existing statistical data on construction activities and investment for the modernisation of buildings is a good starting point to estimate the output of environmental goods and services for energetic refurbishment. However, those sources may not allow determining the share of energetic refurbishment in the modernisation activities. Specialised studies and expert knowledge from civil engineers and architects may help to fill the information gap.

Whenever EGSS characteristics are based on national accounts, it is useful to consider types of producers depending on their industrial classification:

- EGSS producers classified in typical EGSS industries: sewerage (NACE 37), waste collection, treatment and disposal activities and materials recovery (NACE 38) and remediation activities and other waste management services (NACE 39). Using national accounts to estimate EGSS output, gross valued added and employment for those industries is straightforward because they produce almost entirely environmental products. The non-EGSS output of those industries can be singled out using data from the supply tables as far as they provide information on the producers' non-EGSS, secondary activities;⁽⁵⁰⁾
- EGSS producers classified in NACE industries that are not typical for EP or RM but which can be identified as relatively homogenous subgroups within a specific NACE category: This includes, for example, producers of organic farm products within the agricultural industry (NACE 01) and producers of electricity from renewable sources classified within NACE 35.11 (production of electricity). Their output may also be identified using national accounts data. However, national accounts must be combined with data that allow deriving EGSS shares of industries that mainly perform non-environmental activities. Such shares may be estimated using physical production and price data from sector specific statistics and accounts (see example in Box 10);
- EGSS producers which are neither classified in typical EGSS industries nor can be identified as relatively homogenous subgroups within specific NACE categories: This includes, for example, manufacturing and construction enterprises engaged in the supply and installation of environmental technologies or in eco-construction. For these establishments, consulting further supply side sources such as business registers, SBS, PRODCOM and information from trade associations and specialised business association may help to estimate their EGSS shares. Some environmental services (e.g. the wastewater treatment) provided by these producers as

⁽⁴⁹⁾ For example, in Chapter 3 we discussed conceptual differences between output according to ESA and turnover and production in the SBS

⁽⁵⁰⁾ Likewise, supply tables also provide data on the secondary activities of non-typical industries resulting in some production of CPA 37, 38 and 39. This output and the related exports, gross value added and employment are also to be included in the EGSS accounts

secondary output may be identified using the supply tables of the national accounts.

EPEA

Another source of supply side data relevant for the compilation of EGSS are the *Environmental Protection Expenditure Accounts (EPEA)*. EPEA are also governed by Regulation (EU) No 691/2011 establishing mandatory reporting on market, non-market and ancillary output of EP services broken down by separate CEPA classes and groups of CEPA classes.⁽⁵¹⁾ Moreover, Eurostat asks Member States to report output and labour input by all single CEPA classes on a voluntary basis. It is advisable that compilers of EGSS and EPEA accounts coordinate with each other to avoid double work and ensure mutual consistency.

EPEA and EGSS have many common features, and the former can be used as a data source for the latter. The relation between them and the aspects to be considered for a possible integration of their estimation systems is presented in Annex 9.

COFOG

COFOG can be a source for non-market and ancillary output.

The ESA 2010 Transmission Programme, Table 11 collects data on general government expenditure by function. These data are broken down by function according to the Classification of the Functions of Government (COFOG) and by economic nature. COFOG data are a basic source for the determination of non-market output. Although they do not directly give the value of non-market output, they provide the value of general government final consumption which is a reasonable proxy of non-market output.⁽⁵²⁾

As concerns environmental protection, COFOG data are based on CEPA and distinguish: Waste management, Waste water management, Pollution abatement (corresponding to CEPA 1,4,5 and 7), Protection of biodiversity and landscape, R&D environmental protection and Environmental protection n.e.c.; they must be complemented by COFOG data relating to resource management. The 2011 Eurostat manual on sources and methods for the compilation of COFOG statistics gives in its section 4.2.4 some indications on how to use COFOG data to identify expenditure related to resource management.

However one of the limitations of COFOG data is that they are not distributed by NACE; a specific work has therefore to be done on this aspect.

SBS

SBS can be a source for ancillary output.

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.

One of the variables to be reported (on a 3 yearly basis) is the 'Total current expenditure on environmental protection', which is the sum of 'in-house expenditure' and 'purchases of environmental protection services':

- In-house expenditure includes all current expenditure on environmental protection except

⁽⁵¹⁾ Mandatory reporting starts 24 months after the end of the first reference year (2015)

⁽⁵²⁾ Final consumption expenditure (P3) corresponds to P.13 (non-market output) less partial payments for non-market output (P.131) plus social transfers in kind. For environmental protection it may be assumed as a simplification that these two elements are negligible

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.

In general the surveys through which SBS data are collected provide a separate estimate of in-house expenditure, which corresponds to ancillary output. However such surveys do not exist for resource management.

ReMEA

Resource Management Expenditure Accounts (ReMEA) can provide information similar to EPEA but cover resource management activities. So far, however, ReMEA are not yet generally available or published. In some cases data from pilot studies may be available.

External trade and balance of payments

External trade and balance of payment statistics can be used as a source for identifying that part of EGSS output that is exported. Using external trade statistics for EGSS compilation is, however, not without difficulties:

- Generally they do not have explicit information as to whether products are part of EGSS;
- The data of the external trade in goods statistics can include the resale of an imported good to a non-resident (such a transaction is called merchanting in ESA 2010, § 3.164.d), whereas EGSS accounts do not include the exports of an imported good to non-residents. Exports as defined by Regulation No 691/2011 is an 'of-which' item of output (see also section 3.1.2);
- In external trade in goods statistics exports are valued at FOB prices, whereas in EGSS accounts exports – being an 'of-which' item of output - should be valued at basic prices.

Sector specific statistics

Sector specific statistics can be used to estimate shares of the EGSS in broader industries, for example organic farming within agriculture and production of renewable energies within electric power generation. Agricultural statistics allow to calculate physical shares of organic farming in total farming (in terms of production quantities, land use, number of animals), and energy statistics can be used to calculate ratios between the physical amounts of electricity generated from renewable and non-renewable sources. Such shares and ratios are useful proxies to split the output of the broader industries into EGSS and non-EGSS output. Estimates based on physical shares or ratios may be improved when specific output price data or production cost data are available. Physical production data (quantities) and price data can also provide a direct estimate of the environmental output. This is called a 'quantity-times-price' approach.

DEMAND SIDE SOURCES

A demand side estimation is particularly relevant to capture EGSS producers which are not classified in typical EGSS NACE industries nor can be identified as relatively homogenous subgroups within specific NACE categories.

For example, investment in waste management, in the generation of electricity from renewable sources or in energetic refurbishment of dwellings consists of EP and RM goods and services produced by the manufacturing industries, by construction companies or by architects and engineering units. Data on EP investments are available from EPEA. Data for RM investments may

be available from *ReMEA* (countries' pilot studies). An important source is also the *national accounts data on gross fixed capital formation* cross-classified by type of asset and investor industry.

Intermediate consumption and final consumption of EP services are available from the mandatory part of EPEA.⁽⁵³⁾ Moreover, environmental expenditure accounts report also on the intermediate consumption, compensation of employees, gross fixed capital formation and the consumption of fixed capital for the production of environmental products.

Demand side data pose conceptual and practical problems, which, however, can be overcome:

- Demand side data generally include expenditure on imported products but they exclude exports, whereas EGSS output should include exports and exclude imports. This must be adjusted. Export and import data from national accounts and trade statistics can be used.
- The valuation of demand side data differs from supply side data. Expenditure valued at purchasers' prices must be converted to basic prices for the estimation of the EGSS output. For this conversion trade and transport margins and data on taxes and subsidies on products from the national accounts supply table can be useful.
- Data on environmental expenditure (e.g. investment for environmental purposes) are broken down from the demand perspective. In order to use these data for the compilation of EGSS output they must be allocated to the producer industries. For example, EPEA report on investments made by producers of EP services but not on the industries supplying the capital goods and services used for these investments.
- Expenditure account data on the intermediate consumption and gross fixed capital formation for the production of environmental products also includes uses of non-environmental products.

DATA MAPS

The top-down approach should mainly integrate data produced regularly by the statistical system. Whenever possible this approach may be combined with results of EGSS surveys and data from business associations to improve the coverage and data quality.

The integration model combines different statistical sources. Each source may cover only subsets of the EGSS. The sources may be partly overlapping (e.g. data from environmental protection expenditure statistics and investment data from national accounts) or have different scopes. Definitions, classifications and valuation principles in the sources may differ from those of the EGSS accounts. A careful integration is therefore needed to achieve a sufficient coverage of the EGSS while avoiding overlaps and double-counting as far as possible. Data maps assist in this task.

Eurostat has set up a data map integrating data collections from Eurostat's website and a few other international sources publicly available (see Table 12). Eurostat has tested the map at single country level and used it since 2013 for estimating EGSS data for the EU-28 ⁽⁵⁴⁾ as described in the *Practical guide*, which offers simple approaches to compile EGSS accounts and includes detailed descriptions on how the sources have been combined. It has to be stressed that this data map reflects pragmatic considerations for the compilation of EGSS data from sources available from Eurostat's website and points to simple calculation approaches that can be implemented with a limited number of resources and in short time. The Eurostat data map is only an example of a data map; a data map integrating additional data available in the NSIs may be different and provide more complete and better estimates.

Depending on other sources available at national level (e.g. specific EGSS survey among manufacturing and service industries) additional categories or breakdowns may be possible and useful. Each white and grey shaded cell in the Eurostat data map should be estimated. However, for the grey shaded cells no suitable data have yet been identified or tested by Eurostat. Some of them are likely to be small. Dark shaded cells are empty by definition of the main categories.

⁽⁵³⁾ This is, however, not covered by mandatory reporting. Eurostat asks Member States to report these data on a voluntary basis

⁽⁵⁴⁾ The EU-28 estimates published in 2013, 2014, 2015 and 2016 could not yet rely on a sufficiently complete and detailed (voluntary) reporting of EGSS data by the Member States. Therefore the estimates were compiled in a process separate from the EGSS data transmission from countries to Eurostat

The Eurostat data map distinguishes the following pragmatic categories:

- Market and non-market production of EGS: wastewater, waste and water management services;
- Market production of EGS: other than wastewater, waste and water management services: non-capital goods and services;
- Market production of EGS: capital goods and services;⁽⁵⁵⁾
- Non-market production of EGS: other than wastewater, waste and water management services;
- Ancillary production of EGSS.

⁽⁵⁵⁾ Capital goods and services are generally durable products that become (part of) the fixed assets that are used in production for more than one year. Typical capital products for EP and RM purposes are, for example, gas scrubbers, setting basins for sewerage, refuses collection vehicles, wind turbines, noise and heat insulating building materials and their installation

Table 12: Eurostat data map for compilation of EGSS accounts

		Market and non-market production of EGS: waste-water, waste and water management services	Market production of EGS other than waste-water, waste and water management services: non-capital goods and services	Market production of EGS: capital goods and services	Non-market production of EGS: other than waste-water, waste and water management services	Ancillary production of EGS
EP	Protection of ambient air and climate		EPE, NA_64, NA_SUT, LFS	EPE, NA_64, NA_SUT, NA_GFCF, LFS	EPE, NA_64, LFS	EPE, NA_64, LFS
	Wastewater management	EPEA, NA_64, NA_SUT, LFS	likely to be small			
	Waste management					
	Protection of soil, ground-water and surface water		EPE, NA_64, NA_SUT, LFS, AGRI (for organic farming)		EPE, NA_64, LFS	
	Noise and vibration abatement		EPE, NA_64, NA_SUT, LFS			
	Protection of biodiversity and landscape					
	Other EP (protection against radiation, env. R&D and other env. Protection)					
RM	Management of forest resources		IEEAF, NA_64, NA_SUT, LFS		IEEAF, NA_64, NA_SUT, LFS	
	Management of waters		likely to be small	NA_64, NA_SUT, NA_GFCF, LFS		
	Production of energy from renewable sources		NA_64, NA_SUT, SBS, LFS, ENSTAT, IEEAF, IEA, FAO/OECD	NA_64, NA_SUT, NA_GFCF, PRODCOM, LFS	likely to be small	
	Heat/energy savings		likely to be small			
	Other RM			as far as material recovery is recorded in national accounts under NACE/CPA E28 it is included in waste management		

Legend

 = empty cell by definition

 = suitable data not identified yet by Eurostat

NA_64: National accounts aggregates by industry (up to 64 industries) (production and generation of income accounts and employment)

NA_SUT: National accounts supply and use tables (output and intermediate consumption by industries / products, final use and external trade)

NA_GFCF: Gross capital formation by industry (up to 64 industries) (by industry and type of asset)

SBS: Structural Business Statistics

PRODCOM: Statistics on the production of manufactured goods

LFS: Labour Force Survey

ENSTAT: Energy statistics (production quantities and capacities, prices)

IEEAF: Integrated environmental and economic accounting for forests

IEA: International Energy Agency: levelised costs and investment costs for electric power stations

FAO/OECD: Biofuel prices

AGRI: Agricultural statistics: land use, farm accountancy

Market and non-market production of wastewater, waste and water management services

mainly covers, for example, the provision of sewerage services and of collection, treatment and disposal services for non-hazardous and hazardous waste, the desalination of water and collection of rainwater, the maintenance of water mains for reducing water losses, and the provisions of related engineering, consulting and administrative services. Regarding output, exports, gross value added and employment, this category can be based on national accounts at current prices and national accounts employment, both broken down by industries. Data are generally available at A*64 detail level. The most relevant economic activities are NACE 36, which covers water collection, treatment and supply and NACE 37-39, which groups together sewerage, waste collection, treatment and disposal activities, material recovery, remediation activities and other waste management services. National accounts supply tables, which classify output by producer industries, can be used to identify secondary output not falling under wastewater, waste and water management services and - if applicable - to add secondary output of these services recorded in other industries.

If the national accounts data are available at a more detailed level than A*64, EGSS compilers should use it. Additional detail improves in particular the split into wastewater management (CEPA 2) and waste management (CEPA 3). EPEA data can also be used as they provide data on the output of EP services in CEPA 2 and 3 and on the inputs used to produce this output. Data on resource management expenditure can provide information on the management of waters (CReMA 10); so far, however, such data are not yet generally available or published.

National accounts data are often not published at a sufficient detail to distinguish the market and non-market breakdown on wastewater, waste and water management services. EPEA and data on general government expenditure by function (COFOG) can then be useful sources for making this breakdown.

Market production of non-capital products other than wastewater, waste and water management services mainly covers the production of products for EP in the areas of air and climate, soil, groundwater and surface water, landscape, biodiversity, noise and vibration, radiation and environmental protection R&D as well as the production of energy from renewable sources.

A main source for this category is EPEA, in particular data on the market output of corporations in EP services and on the inputs for this production (intermediate consumption, compensation of employees, consumption of fixed capital, labour input). Compilers of EGSS accounts may not have all this information available, in particular because mandatory reporting of EPEA characteristics is limited to a subset of these data.⁽⁵⁶⁾ National accounts can be used as a complementary source in order to calculate EGSS output classified by industries and EGSS employment.

Output of this category can also be estimated from the demand side using data on the intermediate and final consumption of EP services.⁽⁵⁷⁾ The demand side data must then be bridged in order to estimate output of EP services: for this purpose the EPEA also collect data on imports and exports of services. If import and export data for EP services are missing also data from the NA supply and use

⁽⁵⁶⁾ Reporting on the market output of EP services is mandatory, however, not all CEPA classes are covered by mandatory reporting. Mandatory reporting on the market output of corporations only covers CEPA 2, 3 and 4. The collection of data broken down by all CEPA classes is voluntary as well as the collection of data on intermediate consumption, compensation of employees, consumption of fixed capital and labour input for this production

⁽⁵⁷⁾ Reporting is mandatory for final consumption of EP services and for intermediate consumption of environmental protection services by specialist producers. The reporting of intermediate consumption of EP services of the general government and NPISH and for corporations that are not specialist producers of EP services is voluntary

tables can provide information on imports and exports ratios.

Agricultural statistics can be combined with national or agricultural economic accounts to estimate output, gross value added and employment in organic farming. Similarly, energy statistics on physical production and capacities can be combined with national accounts data to estimate the EGSS characteristics for the production of renewable energy. If price data are available also price-times-quantity approaches can be used.

As far as material recovery is recorded in the national accounts under CPA/NACE 37-39 the Eurostat data map covers it under the category *market and non-market production of wastewater, waste and water management services* as part of CEPA 3.

Market production of capital goods and services covers the production of goods used for gross fixed capital formation (investment) and associated services in activities linked with the protection of the environment and the management of resources. This is a very wide range of activities: e.g. manufacture of electric and more resource efficient transport equipment, of exhaust pipes and their parts (also particles filters), of instruments, machinery and apparatus for analysis of pollutants, of septic tanks and pumps for use in wastewater treatment, of vehicles for wastewater collection and sewer cleaning, of lead containers for radioactive waste, of goods for thermal and noise insulation, of specific equipment for the production of energy from renewable sources. It also includes construction work, e.g. for renewable energy power plants including installation of photovoltaic panels, for low energy consumption and passive buildings and for energetic refurbishment of existing buildings. It also can include related engineering and architectural services.

The products covered under this category are mainly produced by producers of machinery and transport equipment, construction companies, architects and engineering service providers as well as producers of computers, electronic products and software.

This category can be estimated using demand side data, in particular data on investments for environmental protection. Also national accounts data on gross fixed capital formation can be used to estimate the supply of EGSS capital goods and services. When these data are available cross-classified by type of asset they can map the investment broken down by investing industries to industries that produce the capital products. National accounts supply and use tables and trade statistics provide data to bridge the gap (exports, imports and valuation differences) between demand side sources and output.

The change in energy producing capacities collected by energy statistics in combination with information obtained from energy agencies is useful information to derive estimates of the production of equipment and installations for the generation of renewable energy and heat/energy savings. Whenever available these data should be supplemented and balanced with PRODCOM statistics (e.g. for wind powered generating sets).

Non-market output other than wastewater, waste and water management services can be based on environmental expenditure. That source also has information on the intermediate consumption, compensation of employees, consumption of fixed capital, labour input used in its production. Compilers of EGSS accounts may not have all the detail available from the EPEA, in particular as mandatory reporting of EPEA characteristics is limited to a subset of these data.⁽⁵⁸⁾ National accounts data can be used as a complementary source in order to classify EGSS characteristics for non-market activities by industries.

Ancillary production is not measured in national accounts. A source for ancillary EP output is environmental expenditure data. The EPEA provide information on the ancillary output of corporations and on the intermediate consumption, compensation of employees, consumption of fixed capital, and labour input used for this production. However, reporting of ancillary output in

⁽⁵⁸⁾ Reporting the non-market output of EP services is mandatory. However, not all CEPA classes must be reported in full breakdown. Mandatory reporting covers CEPA 2, CEPA 3, CEPA 6 and groups together CEPA 1, 4, 5 and 7 as well as CEPA 8 and 9. The collection of data broken down by all CEPA classes is voluntary as well as the collection of data on intermediate consumption, compensation of employees, consumption of fixed capital and labour input for this production

EPEA is not mandatory in full CEPA breakdown.⁽⁵⁹⁾ National accounts data broken down by activity may be used for a more detailed split of ancillary output by industry.

The next section 4.2.2 provides a few examples for EGSS output calculation in the aforementioned pragmatic categories of the Eurostat data map. Section 4.2.3 does it for EGSS exports and section 4.2.4 for EGSS gross value added and employment. More examples and more detailed descriptions of the top-down approaches integrating the various sources (including formulas used and results obtained) are available in the *EGSS Practical Guide*.

4.2.2 Output

The previous section provided the main sources and approaches that may be used for the calculation of environmental products output. This section illustrates how output may be calculated in practice based on the pragmatic categories proposed above.

Example 1: Output of wastewater management services (CEPA 2)

Wastewater management services belong to the first pragmatic category of activities in Eurostat's data map for EGSS accounts compilation.

The compilation of output of wastewater management services can be based on national accounts data broken down by industries and from supply tables. Such data are available with a breakdown by 64 NACE industries and 64 CPA product groups (A*64 level). The product group relevant for wastewater management services is CPA 37-39. Using the information in the supply table we can estimate the output of CPA 37-39 by each of the 64 industries. The product group CPA 37-39 includes sewerage (CPA 37), waste collection, treatment and disposal and materials recovery (CPA 38) and remediation and other waste management services (CPA 39). Only CPA 37 corresponds to CEPA 2.

The national accounts data by 64 industries can be mapped to the NACE categories of the EGSS accounts. The EGSS NACE categories are more aggregated than the A*64 level for the mandatory reporting according to Regulation (EU) No 691/2011 whereas for voluntary reporting they are more detailed (see section 3.2). NACE 36 and NACE 37-39 are to be mapped to NACE section E for mandatory reporting, whereas the data for NACE 37-39 (grouped) are to be mapped to the individual NACE divisions 37, 38 and 39 for voluntary reporting.

The output of the product group CPA 37-39 in the EGSS NACE categories can be calculated by multiplying the output values of the NACE categories (after mapping) with the shares of CPA 37-39 in total output of the NACE categories using information from the national accounts supply table. However this calculation does not isolate wastewater management services. It delivers output estimates that also include services other than CEPA 2. The wastewater management services within CPA 37-39 can be estimated with shares. For example, environmental expenditure data⁽⁶⁰⁾ provide data on output of EP services and related inputs split by CEPA 2 and CEPA 3 which can be used to calculate shares. Alternatively, depending on the data availability, shares of turnover of NACE 37 over NACE 37-39 based on SBS may be used as a proxy for this split. If national accounts are available at a more detailed CPA level than at NACE A*64, these more detailed data should be used. Similarly, shares can also be used to isolate NACE 37 from the group NACE 37-39 (which is only necessary for voluntary reporting, whereas for mandatory reporting NACE 37-39 is grouped within NACE E).

When supply tables are available this approach can identify wastewater management services as principal output of NACE E or NACE 37 and the secondary output by other industries. When supply tables are not available the results for wastewater management services can include some

⁽⁵⁹⁾ Reporting the ancillary output of EP services is mandatory, however, not all CEPA classes must be reported in full breakdown. Mandatory reporting covers CEPA 1, CEPA 2, CEPA 3 and groups together CEPA 4, 5, 6, 7, 8 and 9. The collection of data broken down by all CEPA classes is voluntary as well as the collection of data on intermediate consumption, compensation of employees, consumption of fixed capital and labour input for this production

⁽⁶⁰⁾ EPEA or its predecessor, which is the database established through the OECD/Eurostat Environmental Protection Expenditure and Revenues Joint Questionnaire

secondary output of NACE E and NACE 37 not being part of CEPA 2, while any secondary wastewater management services produced by other industries are not covered by the estimates.

Based on this approach (which is explained in more detail in the *Practical guide*) Eurostat has compiled test calculations to determine the market and non-market output of water management services using data from national accounts as published on Eurostat's website. The following Table 13 shows the result of such a test calculations for Germany:

Table 13: Market and non-market output of wastewater management services, Germany (million EUR)

	2007	2008	2009	2010	2011	2012	2013
Total NACE	15 333	15 298	15 033	15 060	16 725	17 008	17 024
D	342	369	446	437	351	361	345
E36	892	914	747	670	745	726	744
E37	14 099	14 015	13 840	13 953	15 628	15 921	15 934

Source: EGSS Practical Guide, Eurostat 2016, last revision and update of estimates: March 2016

Regulation (EU) No 691/2011 requires reporting market output. Therefore output of wastewater services needs to be split into market and non-market output using. Share estimates can be made. One source to calculate this breakdown is the national account supply table, from which shares of non-market output in the total output of the single industries can be estimated. It is, however, to be noted that the supply tables available in Eurostat do not provide information on this breakdown cross-classified by products and industries. Data available in the NSIs may help to overcome this limitation and allow further refinement of the approach. Another possible source of information on non-market output is EPEA as it reports in a breakdown of services by market and non-market output.

For waste management services (CEPA 3) a similar approach can be used (for more detail see the *EGSS Practical Guide*).

Example 2: Output of environmental products used as gross fixed capital formation for the purpose of waste management (CEPA 3)

The output of environmental products used as gross fixed capital formation for the purpose of waste management (CEPA 3) belongs to the third pragmatic category of activities in Eurostat's data map for EGSS accounts compilation.

This is an example of how an element of this category can be estimated using demand side sources, in particular data on investments. Investment expenditure includes all outlays in a given year (purchases and own-account production) for machinery, equipment, plant, buildings and land used. Relevant investment data for CEPA 3 are available in databases on environmental expenditure and in national accounts.

Data on investment expenditure for CEPA 3 (e.g. from the EPEA) can be split into investments by type of asset using national accounts data on gross fixed capital formation cross-classified by industries and asset types. Depending on the available industry breakdown one may use the asset type breakdown for NACE E or NACE 37-39 or NACE 38 plus 39. Afterwards the asset types must be mapped to the NACE industries that produce them: for example 'other machinery and equipment' to NACE C26 (manufacture of computer, electronic and optical products), NACE C27 (manufacture of electrical equipment) and NACE C28 (manufacture of machinery and equipment n.e.c.), 'transport equipment' to NACE C29_30 (manufacture of motor vehicles, trailers and semi-trailers and other transport equipment), 'total construction' to NACE F (construction), 'computer software' to NACE J (information and communication) and 'intangible fixed assets' to NACE M71 (architectural and engineering activities; technical testing and analysis).

This mapping allows deriving proxies for EGSS output of capital products used for waste management broken down by producing industries. The demand side based proxy does not reflect products imported and exported and the valuation differences between demand side (purchasers' prices) and supply side (basic prices). The problem of export-import adjustment may be tackled with an analysis of trade statistics. When the relevant products cannot be easily identified in the trade statistics a simpler approach is the following: national accounts supply and use tables can be used to derive adjustment factors for trade (exports, imports) and for valuation differences (trade and transport margins, subsidies and taxes on products).

The top-down approach for this category is explained in more detail (together with formulae and numerical examples) in the *Practical guide*, and it is there extended to other EP and RM categories. Based on this approach Eurostat has compiled test calculations to determine market production of EGSS capital goods and services. The following Table 14 shows the result of such test calculations for CEPA categories at EU-28 level:

Table 14: Market production of EGSS: capital goods and services, EU-28 (million EUR)

CEPA/CReMA	2007	2008	2009	2010	2011	2012	2013
Protection of ambient air and climate	7 489	7 945	7 409	7 201	7 317	7 090	7 396
Wastewater management	25 535	27 200	26 877	25 931	25 219	24 555	23 871
Waste management	14 064	15 004	13 649	14 881	14 309	15 125	15 552
Protection and remediation of soil, groundwater and surface water	1 877	2 017	1 956	2 160	2 076	1 995	2 047
Noise and vibration abatement	1 153	1 271	1 234	1 179	930	980	999
Protection of biodiversity and landscapes	4 678	4 888	4 855	4 491	4 481	4 119	4 392
Other environmental protection	2 658	3 415	2 843	2 845	2 826	2 874	3 164

Source: *EGSS Practical Guide*, Eurostat 2016, last revision and update of estimates: March 2016

The mapping of investment expenditure to the NACE industries producing the asset has limitations: investment data for CEPA 3 can also include investment in non-EGSS products (e.g. administrative buildings, office furniture and PCs). EGSS surveys can help to overcome this scope problem. Specific EGSS surveys may collect information on the production of special equipment (e.g. refuse collection trucks, waste compactors, incinerators, storage facilities etc.). To reduce the financial burden of statistical production as well as the burden for survey respondents and at the same time to maintain a high level of quality, detail and coverage in the EGSS statistics survey based approaches can be combined with the top-down approach. For example, in important areas (e.g. manufacture of machinery and equipment, construction, architectural and engineering services) producers may be surveyed only every second to fifth year and in between the survey data could be linked with the result from the top-down approach.

Example 3: Water management services (CReMA 10)

Management of water is a RM activity and comprises activities aimed at minimising abstraction from inland waters through in-process modification, by reduction of water losses and leaks or by substituting the resources with alternative resources, the installation and construction of facilities for water reuses and savings, shower heads and taps.

When estimating directly from supply side data it may happen that the classification of activities in the sources is not detailed enough. Some activities in CReMA 10 may be included in the activities of establishments classified under NACE divisions 36 (Water collection, treatment and supply) and 39 (Remediation activities and other water management services). However, estimations for France show that employment for production and distribution of water is five times higher than for the resource management of water.⁽⁶¹⁾

Future developments of ReMEA may improve the data and overcome data gaps for the estimation of CReMA 10.

⁽⁶¹⁾ Greffet, P., Mauroux, A., Ralle, P., Randriambololona, C. (2012): Définir et quantifier l'économie verte, L'économie française, édition, 2012, p.87-104. According to figures published in this article, 6500 persons were employed in water resource management and 32100 persons in production and distributions of water (both figures for 2009)

Some activities for CReMA 10 may also be found under NACE categories other than NACE section E. For example, installation of water efficient irrigation systems should be found under NACE 01.61 (support activities for crop production), R&D for water management under NACE division 72 and education services for water management under NACE division 85. The identification of CReMA 10 activities under these NACE categories may be possible with more detailed breakdowns. But even with a CPA breakdown by 6-digits they normally cannot be identified and even more detailed information would be needed (e.g. based on specific surveys among providers of architectural and engineering services, R&D and education services). It would suffice to observe such more detailed data in greater intervals (e.g. every 5 years) in order to interpolate the interim years by using constant shares.

A supply side approach for water management services starting from national accounts data is described in more detail (together with formulae and numerical examples) in the *Practical guide*. The results of special investigations to determine the share of CReMA 10 in the activities of establishments classified under NACE 36 and 39 may be combined with output data for NACE 36 and 39.

Example 4: Management of forest areas (CReMA 11A)

The Eurostat Task Force on ReMEA (2013)⁽⁶²⁾ pointed out that the scope of forest management is not well defined. The TF proposed to focus on timber and indicated that the scope of forest management activities should include both naturally regenerated forests and planted forests. In terms of data sources the TF agreed to include both NACE 02.1 (silviculture and other forestry activities) and 02.4 (support services to forestry) in forest management. Excluded would be the classes 02.2 (logging) and 02.3 (gathering of wild growing non-wood products).

The TF noted that the enterprises in the forestry sector are often involved in all the activities described in NACE 02 and that the distinction of NACE 02.1 and 02.4 activities would only be possible by analysing the costs of forestry producers. In summary the data situation would generally require applying costs shares rather than directly using detailed NACE data.

A source for estimating CReMA 11A can be the Forest Accounts which Eurostat collects on a voluntary basis. It collects, among other data, monetary data on the output in trees and tree plants, forest tree seeds, wood in the rough (including logs), non-wood products (e.g. wild growing edible products), services characteristic of forestry and logging activity, other products from connected secondary activities in the local KAU (e.g. charcoal). The relevant CReMA 11A data may be identified from this source. However, the indicative compendium (see Annex 1) indicates that besides fuel wood (which is part of CReMA 13A – renewable energy) other wood production is an environmental activity when complying with sustainability measures. This means that only a part of the aforementioned output would be in the scope of EGSS. The problem is then to determine which part complies with sustainability measures.

The EU Forestry Strategy⁽⁶³⁾ gives general guidance how to distinguish sustainable forest management (SFM) from other forest management. According to this strategy sustainable forest management means using forests and forest land in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels. A second condition for forest management to be qualified as sustainable is that it does not cause damage to other ecosystems.

A practical approach to distinguish sustainable forest management from other forest management can be the use of information from certification. The Programme for the Endorsement of Forest Certification (PEFC) is an international non-profit, non-governmental organization dedicated to promoting SFM through independent third-party certification. PEFC SFM certification provides forest owners and managers with independent recognition of their responsible management practices.

⁽⁶²⁾ Eurostat (2013): Minutes of the meeting of the task force on the resource management expenditure account (ReMEA)

⁽⁶³⁾ Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A new EU Forest Strategy: for forests and the forest-based sector, COM(2013) 659 final, http://ec.europa.eu/agriculture/forest/strategy/communication_en.pdf

According to PEFC, for example, in Germany 7.3 million ha and in France 5.5 million ha are PEFC certified.⁽⁶⁴⁾ A practical approach to estimate CReMA 11A output may consist in collecting data on the share of certified forest area in total forest area and to apply that share to output figures for NACE 02.1 and 02.4. However, output of fuel wood would have to be allocated to CReMA 13A.

Example 5: Output of renewable energy (CReMA 13A)

Renewable energy encompasses a broad range of products pertaining to different NACE industries, using different inputs and technologies. Their unifying feature is that they use renewable sources such as biomass, wind power, solar radiation, terrestrial heat and gravitation.

One approach to estimate the (value of) output of renewable energies is the 'price times quantity approach': physical quantities are multiplied by the corresponding prices to estimate the output.

Regarding the volume component, some renewable energy products such as fuel wood, biodiesel and ethyl-alcohol can be directly identified by their CPA or PRODCOM codes. Production of fuel wood is also one of the sub-headings collected for the Forest Accounts. Other renewable energy products (e.g. electricity from renewable sources) cannot be isolated in the classifications of products. Therefore national accounts, SBS and PRODCOM data are only of limited use for estimating the output of the generation of energy from renewable sources.

Additional sources have to be used. Energy statistics provide detailed data on the quantities of renewable energy, from which physical shares in the total energy production can be derived.⁽⁶⁵⁾

Regarding the price component, some price data are available from international and national bodies: for example, OECD and FAO⁽⁶⁶⁾ publish historical prices for ethanol and biodiesel and a German working group composed of scientific, ministerial and other public institutions published figures on feed-in tariffs for energy from renewable sources⁽⁶⁷⁾. EGSS compilers can contact the regulatory agencies in their countries to find out if they can provide data on the prices effectively received by producers of renewable energy. If this is not the case support mechanisms may be analysed in order to determine the prices received by the producers.

It may be difficult to obtain producer price data for all types of renewable energies. In some cases prices of non-renewable energies may serve as proxies for renewable energy, i.e. (value of renewable energy) = (quantity of renewable energy) x (proxy prices). If prices for non-renewables are used the specific cost structure of renewable energy is, however, not captured nor any specific policy impact (e.g. support measures) on the markets for renewable energies.

As an alternative to the price times quantity approach, a top-down approach would start with the use of national accounts and can be applied when specific data on the prices for renewable energies are not available. To calculate output of electricity from renewable sources the approach starts with national accounts data broken down by industries and supply tables using information on the CPA product 35 (electricity, gas steam and air condition supply).

In a stepwise model more detailed information is integrated: the breakdown of the related industry (using SBS volumes and prices from energy statistics) to separate out the generation of electricity and the physical production of electricity by source (using energy statistics) to separate out the part of electricity from renewable sources.

⁽⁶⁴⁾ <http://www.pefc.org/standards/national-standards/endorsed-national-standards>

⁽⁶⁵⁾ Energy statistics in the EU are governed by Regulation (EC) No 1099/2008 of the European Parliament and of the Council of 22 October 2008 on energy statistics

⁽⁶⁶⁾ OECD/FAO (2015), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database), <http://dx.doi.org/10.1787/agr-outl-data-en>

⁽⁶⁷⁾ AGEE-Stat: Zeitreihen zur Entwicklung der erneuerbaren Energien in Deutschland, December 2013

Table 15: Physical shares of electricity generation from renewable sources in total electricity generation (%), selected countries

	2007	2008	2009	2010	2011	2012	2013
Germany	11.70	11.80	12.40	12.80	15.80	17.60	18.60
France	12.30	13.40	13.60	14.30	11.90	15.20	17.50
Italy	15.70	18.50	23.10	24.00	25.00	28.00	34.20
United Kingdom	3.70	4.40	5.00	4.60	6.90	8.50	11.10

Source: EGSS Practical Guide, Eurostat 2016, last revision and update of estimates: March 2016

The final estimate of the value of electricity generated from renewable sources would, however, have an important limitation: the specific cost structure of generating renewable electricity is not captured nor any specific policy impact on the producer prices for electricity from renewable sources.⁽⁶⁸⁾ Therefore, if price ratios between electricity from renewable and non-renewable sources are known they should be used for the estimation of the output value. In Eurostat's test calculation (see *EGSS Practical Guide*) information on the production costs published by the International Energy Agency and Nuclear Energy Agency (2010) was used to determine proxies for these price ratios. Using this additional information one can determine a value share of electricity generation from renewable sources in total electricity generation (see Table 16).

Table 16: Value shares of electricity generation from renewable sources in total electricity generation (%), selected countries

	2007	2008	2009	2010	2011	2012	2013
Germany	16.60	17.40	19.20	21.40	28.20	31.90	34.30
France	13.20	14.50	15.00	16.00	14.70	19.10	21.70
Italy	18.40	21.40	26.80	28.80	36.30	43.90	50.60
United Kingdom	4.60	5.60	6.60	6.30	9.60	12.70	17.00

Source: EGSS Practical Guide, Eurostat 2016, last revision and update of estimates: March 2016

This top-down approach for renewable electricity is described in greater detail (together with formulae and numerical examples) in the *Practical guide*.

As explained in section 3.1.1 electricity generated by households from renewable sources is an instance of a product produced by a household for own final consumption. That part of the electricity output that is not fed into the electricity grid (i.e. sold at so-called feed-in tariffs) but is directly consumed by the household (as a consumer) or stored (e.g. by using modern accumulator technology) for later use in the same household falls under output for own final use. It is recommended to record such output if it is significant and there are sources available to estimate its value. There is some information in the energy statistics on the quantities auto-produced that may help to isolate the part of output that is for own final use.

Also producers belonging to various other industries may produce electricity from renewable sources for their own internal needs. In order to ensure the best coverage and comparability of the data it is recommended to include this EGSS output either as ancillary or as market output or as non-market output depending on the treatment in the core national accounts.

⁽⁶⁸⁾ Electricity from renewable sources may also have higher prices than electricity from fossil sources if consumers are willing to pay more for it

Example 6: Output of environmental products used as gross fixed capital formation for the purpose of producing energy from renewable sources (CREMA 13A)

PRODCOM statistics provide data on equipment produced for the production of renewable energy (e.g. wind power generating sets, solar cells, hydraulic turbines), but does not provide information on services for the planning, engineering and installation of such equipment. Such information may be brought into the estimation approach using data on investments.

Data on investments in renewable energies are rare. EGSS compilers can investigate whether estimates can be derived from existing sources. Energy statistics⁽⁶⁹⁾ provide data on the production capacities in physical terms (in MW). The change in the production capacities from one year to another may be (with some caution) interpreted as an indicator for investment.

Table 17: Year on year changes in renewable electricity production capacity, Germany (MW)

	2007	2008	2009	2010	2011	2012	2013
Wind	1 615	1 632	1 877	1 488	1 880	2 244	3 356
Hydro	38	0	690	0	218	0	0
Solar	1 271	1 950	4 446	6 988	7 485	7 604	3 694

Source: EGSS Practical Guide, Eurostat 2016, last revision and update of estimates: March 2016

If data or expert information on the investment cost per MW is available (e.g. International Energy Agency, Nuclear Energy Agency, 2010) investment time series can be derived. But at national level there may also exist investment data collected from various sources (e.g. ministerial data⁽⁷⁰⁾, data from energy agencies or publications by companies)

The value of domestic use of special equipment to generate renewable energy (e.g. solar cells and panels, wind power generating sets, hydraulic turbines and water wheels) can be deducted from investment data for the various types of renewable energies. Another approach to determine a value for the domestic use is to combine production data from PRODCOM with export and import figures from trade in goods statistics, which, however, only covers products produced by the manufacturing industry. The difference between the domestic use according to the first and second approach covers those products that are not yet identified by PRODCOM and trade codes (mainly planning, consulting, engineering and construction activities, but also special equipment not identified). The difference can then be split into investments by type of asset, whereby the asset types must be mapped to the NACE industries that produce them: e.g. 'total construction' to NACE F (construction) and 'intangible fixed assets' to NACE M71 (architectural and engineering activities; technical testing and analysis). A useful source for the split is national accounts data on gross fixed capital formation cross-classified by industries (in particular for NACE section D) and asset types.

The top-down approach is explained in more detail in the *EGSS Practical Guide*.

It can be refined using results from specific EGSS surveys. In particular non-environmental products (e.g. administrative buildings, office furniture and computers) that may be included in the investment data should be excluded from the EGSS scope.

Example 7: Non-market output and ancillary output

The estimation of these categories relies heavily on environmental expenditure data. EPEA has data on EP services produced by non-market producers (mainly government) and on ancillary EP services that can be produced in any industry as well as data on the expenditure made to produce

⁽⁶⁹⁾ Under Regulation (EC) 1099/2008 the electricity generation capacities by various types of renewable sources (e.g. solar photovoltaic, wind, hydro) are to be declared

⁽⁷⁰⁾ e.g. Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit: Erneuerbare Energien in Zahlen - Nationale und internationale Entwicklung im Jahr 2013

these services. Unfortunately, this source does not cover resource management. Resource management expenditure accounts are under development but are not generally available yet.

In order to assess the cost of environmental protection for industry, specific surveys have been developed in most European countries. Information on ancillary activities is also available from the SBS: the SBS variable 21 14 0 (Total current expenditure on environmental protection) can be used in the compilation of EP ancillary output. This variable is collected on a 3 yearly frequency. It is collected for all divisions classified within the coverage of NACE Rev. 2 B, C, D35 and E36 and to be broken down by following environmental activities: protection of ambient air and climate, wastewater management, waste management and other environmental protection activities.

It is to be noted that the estimation of ancillary environmental output as part of total EGSS output may result in some double counting if the ancillary activity serves a principal or secondary activity that produces environmental products (e.g. ancillary environmental activity of a waste management company). Only ancillary EGSS output used in the production of non-environmental output should be taken into account. Therefore it is recommended to exclude any ancillary EGSS output of corporations that fall under the EPEA category of specialist and secondary producers of market EP services.

Often information on ancillary and non-market output and related expenditure is not available in a breakdown by economic activity. A proxy for the distribution of the totals by economic activities may then be obtained from national accounts (e.g. output) broken down by industries.

More details on practical approaches to estimate EGSS non-market and ancillary output are available in the *EGSS Practical Guide*.

4.2.3 Exports

MAIN DATA SOURCES

Trade in goods statistics are available in Eurostat's online database, for example the collection 'EU trade since 1988 by CN8 (dataset DS-016890)' and the traditional international trade database access ComExt. Some examples of international trade codes relevant for identifying environmental goods exports from the CN-8-digit-classification were shown in Table 8 of section 4.1 for the micro data approach.

However using trade statistics for estimating EGSS exports may pose problems whenever there is significant merchanting with an EGSS good as the resale of an imported good to a non-resident is generally not to be included in EGSS exports (see also section 3.1.2). A careful analysis of the basic sources on exports is therefore needed. Reporting thresholds on small exporters such as those producing specialist organic products on a small scale and selling them in markets just over the border may have an impact. Data on exports should be compared with data on imports and production to identify whether trade data may include major merchanting activities. Merchanting can be one of the reasons why export figures in trade statistics are sometimes bigger than production figures from PRODCOM (see for example Table 18 for the product group that includes photovoltaic solar cells). Small amounts of production sold of a product together with big exports and imports of the same product may indicate significant merchanting; in such a case (positive) net exports may be a better proxy for EGSS exports. A closer look at the individual units involved in that trade may then be necessary in order to measure with acceptable accuracy that part of a country's output of environmental products that is exported.

Table 18: Value of exports and production of photosensitive semiconductor devices and light emitting diodes (CN 8541.40 and PRODCOM 26.11.22.40), in EUR, year 2013

	Exports	Production	Exports/production
Denmark	15 923 430	12 219 392	1.3
Germany	2 077 733 050	1 100 894 214	1.9
France	278 501 920	114 258 402	2.4
Spain	94 418 010	42 748 954	2.2
Hungary	108 893 330	88 310 149	1.2
Italy	273 961 790	613 845 000	0.4
Lithuania	1 796 040	2 268 304	0.8
Poland	14 591 270	4 568 481	3.2
United Kingdom	304 277 520	344 647 105	0.9

Source: ComExt, Eurostat website

A source for trade in services is the balance of payment (BoP) statistics. For example, the World Trade Organization publishes on its website⁽⁷¹⁾ data on exports of environmental services derived from statistics on international service transactions. BoP statistics can also be downloaded from Eurostat's online database collections on *International trade in services, geographical breakdown (bop_its)* and *International trade in services, geographical breakdown (BPM6) (bop_its6)*. The BoP code 282 for *waste treatment and depollution* includes the treatment of radioactive and other waste; stripping of contaminated soil; cleaning up of pollution including oil spills; restoration of mining sites; and decontamination and sanitation services (hence covering important activities to be classified under CEPA 3, CEPA 4 and CEPA 7). Also included are other services that relate to the cleaning or restoring of the environment. However, the classification of services in the BoP is mostly not detailed enough to identify the exported services in all environmental activities or to make a split by them.

SBS is another source for *exports broken down by economic activities*. For example, statistical data on the manufacturing industry may also contain data on foreign turnover. If the EGSS producers within this industry can be identified, a value for the EGSS exports of the industry can be derived.

Yet another source of relatively detailed data on exports are the *national accounts supply and use tables*. Export data from the use tables are available in a breakdown by CPA product codes. The export data can be related to the output of the products in the supply tables.

ESTIMATION APPROACHES

The national accounts use tables show data on the exports of products classified by CPA. The aggregation level is normally the division (88 headings corresponding to NACE Rev.2 divisions), although some countries produce more detailed data. The ESA transmission programme governing the transmission of national accounts data from countries to Eurostat foresees the A*64 aggregation level.

When CPA codes refer to products that are considered to be entirely (100%) EGSS products national accounts directly give the value of exports of environmental products. This is the case in particular for CPA divisions 37, 38 and 39 (which mainly relate to wastewater management, waste management, materials recovery and to remediation services). These divisions are grouped together at the A*64 aggregation level which means that their overall export value is available. As the mandatory part of the EGSS questionnaire uses the A*21 aggregation level the detail available in the A*64 use tables is sufficient to estimate EGSS exports of these EP services. However, estimating exports of these services at division level (voluntary reporting) requires additional information. If the share of exports is relatively low, it may also be acceptable to apply export to output ratios obtained for CPA 37-39 to the single divisions within this group without any major bias in the total amount of EGSS exports.

⁽⁷¹⁾ <http://i-tip.wto.org/services/Search.aspx>

For other CPA product groups that are not entirely EGSS products, the national accounts use table may be used as well, however, not directly. The use table combined with the supply table allow for each CPA position to estimate the ratio of exports to output. Assuming that these ratios are representative for the environmental products within the CPA positions, multiplying them by the EGSS market output (broken down by NACE) may estimate the value of EGSS exports. This approach is described in some more detail in the *Practical guide*.

For industries with a very low share of EGSS production the approach based on A*64 supply and use tables may not produce reliable results. An analysis based on trade statistics can supplement the estimation. As shown in Table 8 in section 4.1 some trade codes corresponding relatively closely to EGSS goods can be identified. However, the usefulness of trade statistics for estimating EGSS exports is limited.

Some reconciliation with data from trade statistics is therefore useful. The *Practical guide* proposes this step for the exports of capital goods for the production of energy from renewable sources (CReMA 13A). For these resource management domains the results obtained by applying ratios of export over output from the national accounts supply and use tables are reconciled with export data extracted from trade in goods statistics for relevant product categories (mainly wind powered generating sets, hydraulic turbines, photovoltaic cells).

For countries that have established a micro database on EGSS producers it may be possible to combine micro data with trade statistics by merging business identification numbers in order to determine EGSS shares for individual trade codes. Specific EGSS surveys that also collect data on exports or additional questions to existing surveys can also be useful for the estimation of EGSS exports.

4.2.4 Gross value added and employment

There are fewer direct sources to estimate EGSS gross value added (GVA) and employment than for output and exports.

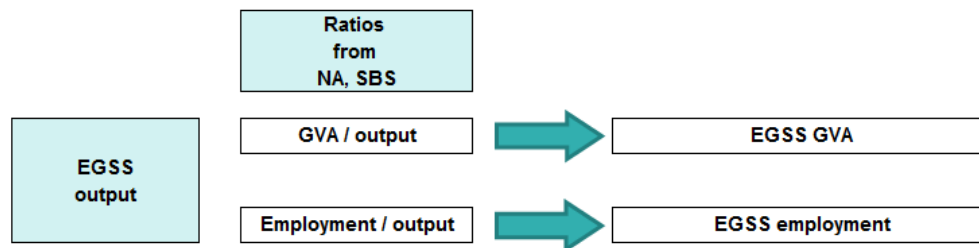
If there is no specific survey that collects gross value added and employment related to EGSS the best option is to use ratios of GVA to output and employment to output and to apply these ratios to the estimated EGSS output.

The most practical way of compiling such ratios is to extract data from national accounts: output data, GVA and employment are generally published in national accounts with a breakdown up to 64 industries and can be easily aggregated to the breakdown required for the EGSS accounts.

SBS data may also be used to derive such ratios: in particular whenever they are available at a more detailed industry breakdown than national accounts (classes instead of divisions) they may better represent gross value added and employment for the EGSS production within the industries.

Another possibility is to use national accounts data at more detailed level than 64 industries. Such data are normally not published, but they may be available in the NSI and potentially accessible for national EGSS accounts compilers.

Figure 5: Determining EGSS gross value added and employment



GROSS VALUE ADDED

National accounts data allow calculating ratios of GVA to output for the various industries in a relatively homogeneous way as the NACE categories of national accounts should group together establishments (LKAUs). EGSS output by NACE categories multiplied by the national accounts' *GVA to output ratios broken down by NACE categories* may serve as a proxy for the EGSS GVA generated through the production of environmental products. The approach is described in some more detail in the *EGSS Practical Guide*.

However national accounts data also has its limitations: Firstly, applying ratios derived from national account may not always adequately represent the ratios for the EGSS producers in the same industry, which can be particularly relevant for industries with only a small share of EGSS producers. Secondly, data broken down by industries may not be available cross-classified by institutional sectors; applying ratios derived from the total of institutional sectors to the single categories of output (market, for own final use, non-market and ancillary) may create some bias. It is therefore recommended to cross-check the ratios obtained from national accounts with more specific information on EGSS producers (e.g. if available from survey data).

SBS data are available at a more detailed activity level (NACE classes). Therefore ratios obtained from SBS may better represent EGSS producers. As SBS mainly refers to market activities SBS ratios may cause less bias when estimating the GVA of EGSS market activities. However, as we have seen in sections 3.1.1 and 4.1.2, there are conceptual differences that limit the usefulness of the SBS data for the compilation of EGSS accounts.

In conclusion: both SBS and national accounts have their advantages and disadvantages for the estimation of EGSS GVA: National accounts are conceptually aligned to EGSS accounts, but they are often not available in a sufficient level of detail by industry and sector. SBS data are more detailed by industry and may better represent EGSS market activities, but may require conceptual and scope adjustments in order to align with the definitions of the EGSS accounts characteristics. EGSS accounts compilers should try to obtain from their national accounts colleagues more detailed data than NACE A*64 and if possible also cross-classified by institutional sector.

Whenever EGSS output is compiled using national accounts data as a starting point, GVA to output ratios derived from national accounts should be the first priority. Whenever SBS data are available at more detailed level, they may be used to cross-check and refine the estimates. Care is necessary to control for conceptual and scope differences.

Work at an inadequate level of activity breakdown is likely to cause bias in the GVA estimates for renewable energy production. For example national accounts and SBS data for NACE 3511 are most likely not representative for the generation of electricity from renewable sources as the input structure is too different. The estimation of this ratio requires specific research.

EMPLOYMENT

If there is no specific survey that collect employment related to EGSS output, the best option is to use ratios of value of employment to output. These ratios may be based on national accounts or SBS data.

EU Member States produce annual estimates of national accounts employment, which is an auxiliary variable aimed to calculate ratios like gross value added, output, or labour costs per person employed. National accounts data allow calculating the ratios employment over output for the various industries in a relatively homogeneous way as the NACE categories of national accounts should group together establishment or local kind of activity units (LKAUs).

Using ratios from national accounts to estimate EGSS employment has similar limitations as for GVA: ratios derived from broader NACE industries may not always adequately represent the ratios for the EGSS producers in the same industry and data broken down by industries may not always be available cross-classified by institutional sectors.

It is therefore recommended to cross-check the ratios obtained from national accounts with more specific information on EGSS producers. Such an approach is proposed in the *Practical guide*. In particular, instead of directly estimating employment from the ratio of employment to output, the *EGSS Practical Guide* proposes to first decompose it into two ratios:

$$\text{ratio of employment to output} = \text{ratio of compensation of employees to output} / \text{ratio of compensation of employees to employment}$$

Table 19: Ratios of compensation of employees to output for selected industries and countries (%), year 2008

NACE	Belgium	Germany	Greece	Italy	Slovakia	Finland	UK
A	11.5	10.9	28.0	22.6	34.6	35.8	28.2
B	16.0	27.2	37.0	11.4	20.5	14.9	9.4
C26	25.5	23.7	20.3	20.0	4.1	10.5	27.3
C27	28.0	26.4	13.8	15.4	14.7	17.1	28.0
C28	21.6	22.8	28.8	16.3	19.6	15.1	28.7
D	17.4	11.1	17.6	5.5	4.1	9.8	7.1
E36	31.8	21.0	41.9	20.6	30.9	18.1	17.5
E38	12.7	18.5	20.8	16.4	21.9	1.9	21.0
F	15.7	27.8	13.4	13.7	9.6	23.2	20.4
J	25.4	24.4	19.7	17.1	19.6	28.6	34.8
M69-M70	13.9	27.5	15.4	12.7	24.3	37.2	35.1
M71	23.9	31.5	11.2	9.8	15.8	36.3	38.5
M72	52.5	31.2	31.9	45.8	47.5	41.9	26.6
O	65.7	55.4	51.9	52.1	44.2	40.3	41.1

Source: *EGSS Practical Guide*, Eurostat 2016, last revision and update of estimates: March 2016

Table 20: Ratios of compensation of employees to employment for selected industries and countries, year 2008 (EUR/FTE)

NACE	Belgium	Germany	Italy	Greece	Slovakia	Finland	UK
A	26 500	10 933	20 901	15 051	34 467	26 596	36 571
B	51 968	50 076	42 707	47 751	13 746	39 206	89 407
C26	71 662	59 253	41 275	21 966	10 767	66 434	51 669
C27	57 872	55 462	35 798	22 181	10 124	43 789	50 853
C28	58 248	52 225	42 107	21 468	13 187	49 627	51 108
D	111 254	59 500	56 592	51 989	19 614	57 998	63 310
E36	68 169	47 144	43 976	37 672	14 430	33 870	36 765
E38	53 224	38 321	36 125	38 059	10 369	4 774	70 325
F	35 131	28 601	19 818	12 208	7 554	38 046	28 503
J	66 696	53 405	38 761	31 939	17 242	51 109	61 125
M69_M70	19 313	40 820	14 190	10 385	10 372	39 052	34 229
M71	41 110	32 627	10 222	6 780	11 018	45 729	47 898
M72	83 935	55 391	56 294	25 874	12 467	54 393	55 408
O	53 797	44 671	51 435	33 091	16 570	40 986	48 802

Source: EGSS Practical Guide, Eurostat 2016, last revision and update of estimates: March 2016

This decomposition allows for additional cross-checks of the ratio of compensation of employees to employment with data on wage rates⁽⁷²⁾ or to supplement the information by data on labour intensities. One example from the *Practical guide* where such integration of additional information is proposed is the estimation of employment for the generation of electricity from renewable sources. Electricity from renewable sources and non-renewable sources are different in terms of labour needed for operating and maintenance. Based on published international data (International Energy Agency, Nuclear Energy Agency, 2010) mark-up factors for the ratios of compensation of employees to output can be estimated and used in order to reflect that operating and maintenance costs (O&M) for electricity generation from renewable sources can differ from those for electricity generation from non-renewable sources. Estimation results for Germany are shown in Table 21.

Table 21: Mark-up factor for the ratio of compensation of employees to output for electricity from renewable sources, Germany, years 2007-2011

2007	2008	2009	2010	2011
1.06	1.07	1.087	1.123	1.146

Source: EGSS Practical Guide, Eurostat 2016

National accounts employment data are generally measured in number of persons and the number of full-time equivalents (FTE) may not be available. If FTE figures are not available EGSS accounts compilers should convert the figures on the number of persons employed into FTE. The Labour Force Survey can be used for this purpose as explained in section 3.1.4. An approach to convert data on employed persons into FTE is to use the share of part time employment in total employment (s) and the ratios between hours worked by part-time workers and full-time workers (p), using the formula:

⁽⁷²⁾ For any such comparison we must be aware that the ESA definition of compensation of employees includes not only cash, but also in-kind compensation and employer's actual and imputed social contributions (see ESA 2010, §§ 4.01-4.13). It does, however, not include the income of the self-employed persons (which are part of employment). In the case of unincorporated enterprises in the household sector, the balancing item from the generation of income account ("mixed income") implicitly contains an element corresponding to remuneration for work carried out by the owner or by family members

$$\text{FTE per employed person} = s(p-1) + 1; 0 < p < 1$$

(see Table 22). More details can be found in the *EGSS Practical Guide*.

Table 22: Ratios FTE to persons employed, shares of part time employment in total employment (s) and ratios of hours worked per employee in part-time and full-time employment (p)

FTE per person employed	Share of part-time employment (s)	Ratios of hours worked by employees part-time and full-time (p)
1	0	any value
0.995	0.1	0.5
0.993	0.1	0.3
0.9	0.2	0.5
0.86	0.2	0.3
0.85	0.3	0.5
0.79	0.3	0.3

$$\text{FTE per employed person} = s(p-1) + 1; 0 < p < 1$$

Source: *EGSS Practical Guide*, Eurostat 2016

SBS data on employment are available at a more disaggregated activity level (NACE classes) than NA data. Ratios obtained from SBS may sometimes better represent EGSS producers; and as SBS mainly refers to market activities SBS ratios may cause less bias when estimating the employment for EGSS market activities. But as we have seen in sections 3.1.1 and 4.2 there are conceptual and scope differences that limit the usefulness of the SBS data for the compilation of EGSS accounts.

Data collected in the framework of the SBS Regulation include several variables relating to employment (see also 3.1)

- 16 11 0 Number of persons employed:
total number of persons who work in the observation unit
- 16 13 0 Number of employees:
persons who work for an employer and who have a contract of employment receive compensation and receive compensation in the form of wages, salaries, fees, gratuities, piecework pay or remuneration in kind
- 16 14 0 Number of employees in full-time equivalent units (FTE)

For the purpose of EGSS reporting, the most relevant ratio is the ratio between output and number of employees in FTE. However the number of employees does not include self-employed persons. It is therefore incomplete. This may be particularly relevant for activities such as environmental consultancy and specialised construction services which have a high share of self-employed engineers, architects and craftsmen. A correction may be necessary on the basis of the share of employees in the total number of employed persons.

In conclusion, as seen above for GVA, both SBS and national accounts have their advantages and disadvantages to estimate EGSS employment. The guidelines given above for GVA are also valid for employment.

5

Use and presentation of EGSS data

This chapter provides an overview of the possible uses and presentations of EGSS data. First there is a short summary of which policy questions may be served by EGSS accounts (section 5.1). Next, the chapter presents various descriptive presentations (section 5.2).

5.1 Overview uses of EGSS accounts data

The EGSS accounts collect data on the output, employment, exports and value added generated in the production of goods and services that are used to measure, prevent, limit, minimise and correct environmental damage and manage natural resources in a sustainable way.

As a sector with great prospects, it is very important to investigate the contribution of EGSS to economic growth, innovation potential, technological development, barriers to international competition, job opportunities, the role of the government, the evolution and size of environmental goods and services and the ability to meet environmental protection goals.

The data can be used for example to analyse the relationships between environmental policies and economic development. How economic actors (including governments and final consumers) react on pressures that arise from environmental and natural resource constraints. What is their level of spending that is caused by the needs to protect the environment and the natural resources; and how much of the economies' production factors are engaged in producing goods and services that are used in environmental protection activities and resource management domestically or abroad. Does the internalisation of environmental concerns in economic decisions impede economic growth or does it stimulate economic development through higher investment, more jobs, higher incomes and better quality of life. What is the role of environmental and resource management considerations in the creation of technical progress and for the global technology transfer?

Some important factors affecting the EGSS are regulation and policy objectives, technological change, globalisation, the emergence of new market segments and the shift towards incentives and economic instruments that enable environmental technologies to compete with traditional industries.

Some examples of policy questions which can, in principle, be served with EGSS accounts data are shown in Table 23. Some of them require combining EGSS with other data sources, and some cannot be served with the present status of development of EGSS accounts. Those are marked with an asterisk.

Table 23: Examples of policy questions served with EGSS accounts data

Policy questions	Variables/indicators
EGSS contribution to economic growth	Annual growth in output, gross value added, employment, etc. *Investment, employment by skills level, direct and indirect employment
Size and growth of the EGSS	Output, gross value added, employment and type of jobs *Number of enterprises, turnover
EGSS contribution to international trade	Exports, imports, international direct investment, licensing agreements
EGSS contribution to regional, structural strategies	Output, gross value added, employment, etc., by region or industry structure
Cost of environmental services	Price per unit of environmental services (e.g. \$/tonne of treated waste)
Ability of EGSS activities to meet environmental protection goals	EGSS activities linked to environment indicators
Environmental goods and services industry contribution to sustainable development	Preventive activities' (e.g. cleaner technologies and products) share of total environment industry output
Job opportunities	Employment growth *Employment growth by skills level, job tenure
Barriers to international competition in the provision of environmental goods and services	Share of the market served by national suppliers *Share of the market served by local suppliers or monopoly suppliers, ownership (domestic/foreign, public/private), mergers and acquisitions, taxes, subsidies, sales and purchases by market (domestic/European/foreign), profit or loss, joint venture and licensing agreements, exports, etc.
EGSS and innovation and investment expenditure, non-economic data, e.g. patent counts	*Environmental R&D data, patents for environmental technology, cleaner technologies and product data, end-of-pipe expenditure versus integrated expenditure, level of highly skilled workers (educational levels), etc.
Interaction between R&D policy and environmental technology development	*Environmental R&D as share of total R&D; new patents for environmental technology
Ownership, concentration and structure of the EGSS	*Number and size of producers by ownership (domestic/foreign, public/private), mergers and acquisitions

In particular, the analysis of output, value added, employment and exports helps to answer a number of questions on different aspects of the environmental goods and services sector such as:

- What is the potential for growth?
- What is the potential for employment creation?
- What has been the evolution in the development and the export of environmental goods and services?
- Is there progress in research and development for cleaner technologies and products?
- What is the progress in the different environmental domains?
- What is the competitiveness of the sector concerning cleaner technologies and products?

- Do the environmental and economic policies have an impact on the sector?
- What is the efficiency of the sector?

Besides the potential of EGSS accounts to answer those questions, EGSS can contribute as one of several integrated environmental accounts to describe in broader terms the environmental situation and the impact of human activity on natural resources. This demand is best satisfied by a system of physical flow and stock data that describe the pollution of the environment through environmentally harmful substances released by the productive and consumptive activities of humans (e.g. air emission accounts) and the use and depletion of natural resources (e.g. material balances).

Main breakdowns

Due to the complex nature of the environmental goods and services sector, it is necessary to examine its composition. The data collected on the EGSS can be analysed at different levels. These include:

- Analysis by **economic variable**. Comparing data on the EGSS by economic variable reveals some interesting figures on the main characteristics of the sector in terms of employment, output, gross value added and exports. Furthermore, these variables may be used to provide information on productivity and competitiveness, for instance.
- Analysis by **economic sector**. EGSS accounts do not provide breakdowns by institutional sector (corporations, government, etc.) but they do provide breakdowns by NACE, which may serve as a proxy. Comparing Corporations and General Government provides information on, e.g., the importance of public ownership and the evolution of privatisation.
- Analysis by **environmental domain**. Comparing data on the EGSS by environmental domains reveals which are the main domains of specialisation for environmental producers in a country. This analysis is important because a large majority of environmental companies focus on only one of the environmental domains and the competitive conditions in each of the domains can vary significantly. Combined with the environmental protection expenditure data, the analysis of the EGSS can also provide an indication of the environmental priorities of the countries.
- Analysis of **time series**. Time series of employment, output, gross value added and exports can give an indication of the evolution of the EGSS, its 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.

5.2 Descriptive presentation of EGSS data

This section presents examples how EGSS data may be presented with breakdowns according to various classifications. This is illustrated for the output characteristic. Breakdowns may be similarly applied to the other characteristics: exports, gross value added and employment.

OUTPUT BY CEPA/CREMA

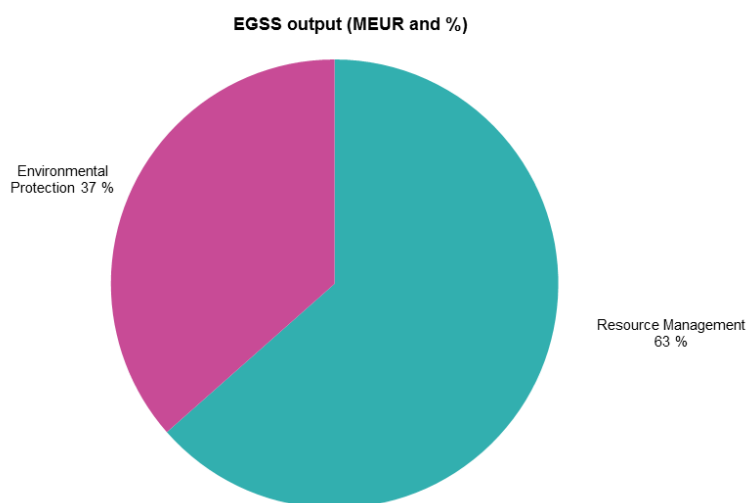
Distribution of output by classifications of environmental activities (CEPA/CREMA) or economic activities (NACE) allows answering questions like e.g. which activities contribute the most to output. Most of these analyses are also possible for the other EGSS characteristics.

EGSS output can be reported at two levels of CEPA/CREMA: domains and classes of the classifications. The first one (see Figure 6) shows the respective parts of environmental protection and resource management in the output of environmental products, whereas the second one (see resource management in Figure 7) gives more information on the distribution of output by classes and their groupings.

Data may be presented in a pie chart displaying the respective values and/or shares of EGSS output for environmental protection and resource management, or in the form of a bar chart displaying the value of output for the various CEPA and CReMA classes.

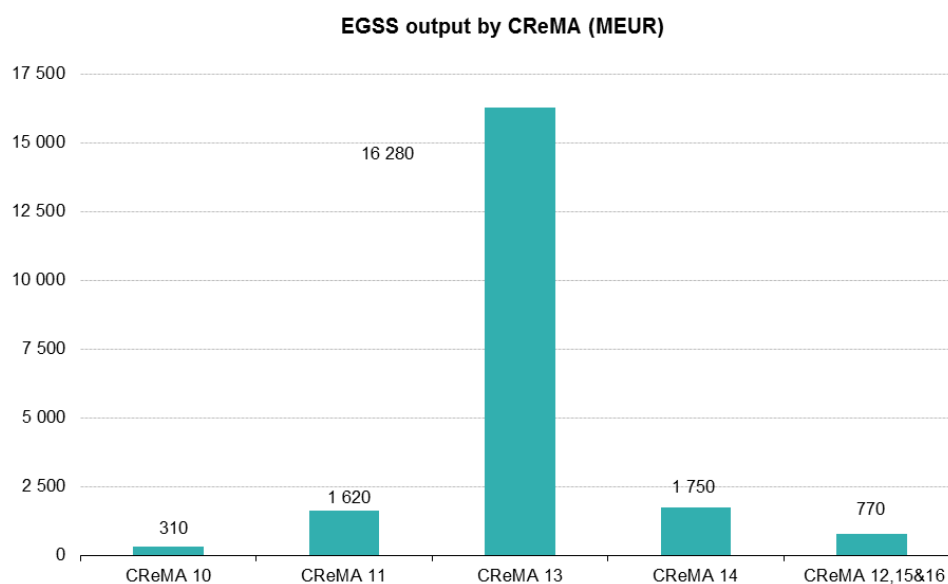
The presentation in Figure 6, while based on a fictitious data set, highlights the importance of CReMA 13 (energy management) in the total EGSS output for resource management.

Figure 6: Example of presentation of EGSS output by environmental domains



Source: Fictitious data set

Figure 7: Example of presentation of EGSS output by environmental domains



Source: Fictitious data set

OUTPUT BY NACE

The distribution of EGSS output by NACE sections and divisions can offer interesting indications on which industries contribute most (or least) to the production of products for EP and RM.

Data on EGSS output distribution by NACE can be presented in the form of a pie chart or bar chart according to a selection of NACE sections and divisions for EP and RM. This presentation can show absolute values or shares in the total EGSS output. The latter facilitates the comparisons between countries' profiles.

Figures 8 and 9 present shares of total EGSS output respectively for EP and RM in the form of a bar chart.

Figure 8 shows that NACE 38-39 (waste collection and treatment, materials recovery and remediation activities) contributes to 30 % of EP output. Figure 9 shows that one third of the EGSS output on RM comes from NACE section D (electricity, gas, steam and air conditioning supply), which indicates that renewable energy production is an important contributor to RM. NACE F (construction) has a share of 18 %, which is relatively high as this industry carries out much of the installation of equipment and materials used for the generation of renewable energy and for energy savings. The production of specific RM equipment is mainly found in NACE section C (e.g. the manufacturing of wind turbines in C28, contributing with 14 %).

Figure 8: Distribution of EGSS output by group of environmental domains and NACE

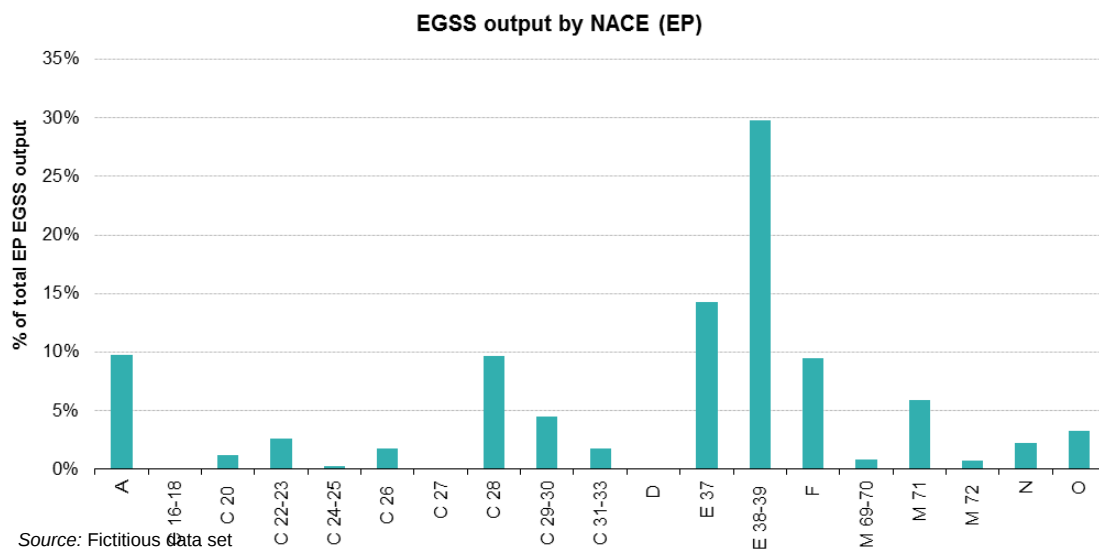
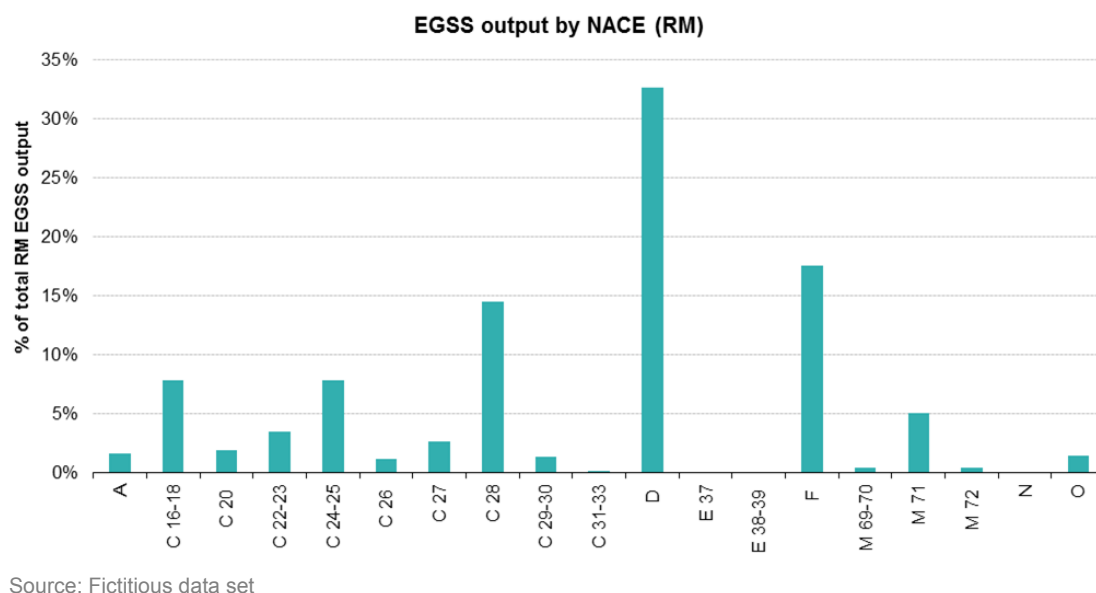


Figure 9: Distribution of EGSS output by group of environmental domains and NACE



PUTTING CHARACTERISTICS IN RELATION

Ratios between the various EGSS characteristics provide further insights. Examples are output over gross value added, gross value added over employment or market output over exports. The tables below present some examples of ratios between characteristics.

Output and exports

Relating exports to output highlights the importance of foreign markets for the EGSS.

Table 24: EGSS exports as a share of total EGSS output (%)

	2005	2006	2007	2008	2009	2010	2011	2012
Germany	:	:	32.6	:	18.8	24.4	:	:
France	:	:	:	3.6	1.8	2.5	9.5	:
Latvia	:	:	:	7.8	5.3	7.1	:	:
Luxembourg	:	:	:	:	:	:	:	36.4
Poland	:	:	16.7	:	:	:	:	:
Romania	34.3	34.2	21.1	18.3	21.4	22.8	28.1	28.6

Source: Eurostat (online datacode env_ac_egss2); last update 19.04.15 extracted on 18.06.15

The degree of internationalisation of the EGSS varies by activity. In general, equipment, e.g. for air pollution control, renewable energy production, is easily exported and open to international trade, while services such as the collection and treatment of sewage and waste are more dependent on local market needs and tend to be organised more at national level. Further analysis, e.g. by classes of CEPA and CReMA classifications, NACE divisions or categories of market output, may explain the contribution of certain products (e.g. secondary raw materials, cleaner energy products or equipment) to exports. The EU and other members of the World Trade Organization (WTO) seek to boost international trade in products that directly contribute to environmental protection and climate change mitigation by liberalising trade in environmental goods and services through negotiating an Environmental Goods Agreement (EGA).⁽⁷³⁾

⁽⁷³⁾ See DG trade <http://trade.ec.europa.eu/doclib/press/index.cfm?id=1116>

Output, gross value added and employment

Table 25 shows output, gross value added and employment for the various categories of output. It also presents ratios of output and gross value added to employment and of gross value added to output.

Gross value added by person employed (expressed in full time equivalent) is a measure of labour productivity. This measure is relevant by itself; it may also be broken down by categories of EGSS output (market, non-market, etc.) and calculated for the different CEPA and CReMA classes and by industry. Labour productivity in EGSS by industry may be compared with labour productivity of the total economy by industry.

Table 25: Output, gross value added and employment by category of output (France 2011)

	Output (mio EUR)	GVA (mio EUR)	Employment (FTE)	Output / FTE (thousand EUR)	GVA / FTE (thousand EUR)	GVA / output (%)
Total	75 983	26 814	416 847	182.3	64.3	35
Ancillary output	3 149	1 297	15 363	205.0	84.4	41
Non market output	14 946	7 788	107 613	138.9	72.4	52
Market output, of which	57 888	17 729	293 871	197.0	60.3	31
Specific services	29 481	9 269	130 152	226.5	71.2	31
Cleaner and resource efficient products	15 689	4 614	80 935	193.8	57.0	29
Other environmental products	12 718	3 846	82 784	153.6	46.5	30

Source: Eurostat (online datacodes env_ac_egss1 and env_ac_egss2); last update 04.01.2016 extracted on 03.02.16

RELATING EGSS TO THE NATIONAL ECONOMY

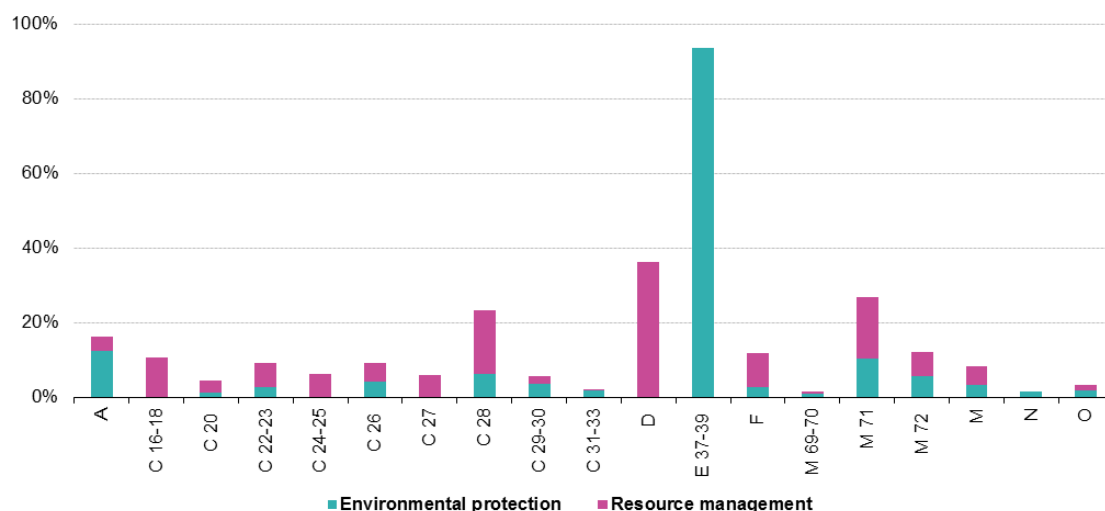
One of the strengths of EGSS accounts is that the definitions of output, gross value added, exports and employment are the same as from national accounts, and correspondingly comparing the aggregates from EGSS accounts and national accounts is straightforward.

Output

EGSS output can be related to the total output of the national economy. This comparison is also relevant by NACE sections and divisions. Whereas EGSS output generally represents only a small share of the total economy, the EGSS shares are much higher for NACE sections and divisions that are typical EP and RM producers.

In Figure 10 EGSS output for EP from NACE 37-39 represents almost 100% of total output of NACE 37-39 whereas EGSS output for RM from NACE D represents almost 35% of NACE D total output; in the last case it means that renewable energy is an important contributor to electricity, gas, steam and air conditioning supply.

Figure 10: Share of EGSS output in total output by NACE



Source: Fictitious data set; selected NACE sections and divisions

Gross value added

The gross value added of EGSS activities may be related to the gross value added of the total economy, i.e. the value generated by all units of the national economy engaged in a production activity (see Table 26).

Table 26: Gross value added, share of EGSS over the national economy, most recent year available (2011-2012)

Share EGSS over total	
France	1.40
Latvia	1.80
Lithuania	1.70
Luxembourg	1.90
Netherlands	2.30
Romania	1.50

Source: Eurostat (online datacodes nama_10_a64 and env_ac_egss2)

Employment

Employment is an important EGSS characteristic. It covers all persons engaged in the EGSS in productive activity. EGSS employment directly relates to 'green jobs' and 'green employment', much sought by policymakers. In July 2014, the Commission published the '*Green Employment Initiative*' Communication, in order to underpin the employment challenges and opportunities towards the transition to the model of a 'green economy'. This communication complemented the ones on the '*Circular Economy*' and on a '*Green Action Plan for SMEs*', and presented an integrated framework for employment and labour market policies at EU and national levels, highlighting the significance of:

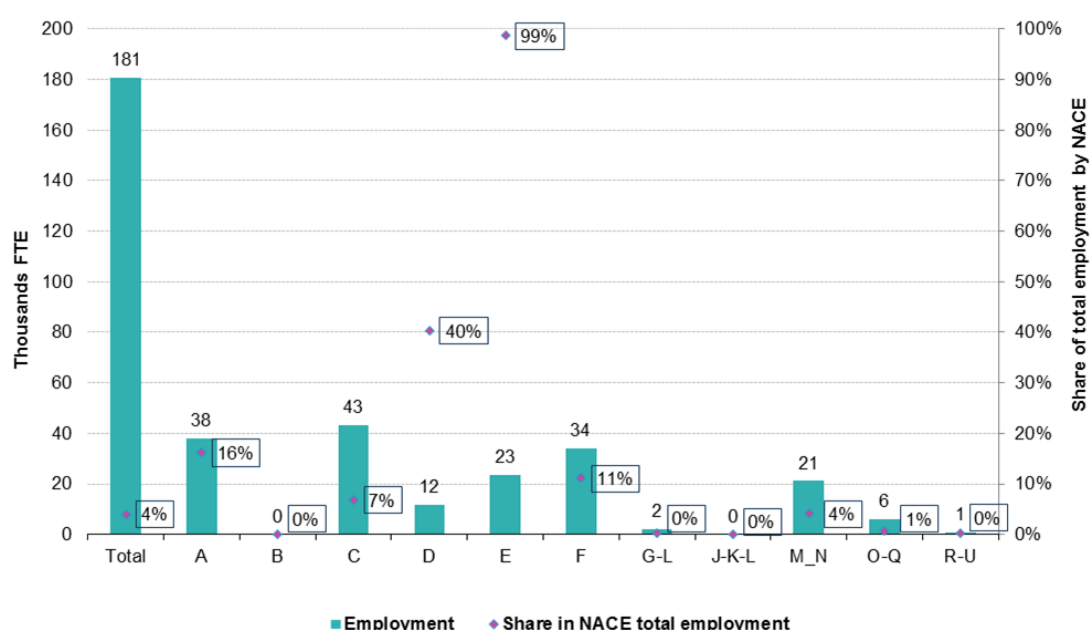
- Securing labour market transitions
- Anticipating and establishing adequate skills policies to assist workers to adapt to structural changes

- Making governance and partnership-based initiatives stronger

This communication states that ‘The potential of employment creation linked to the production of energy from renewable sources, energy efficiency, waste and water management, air quality, restoring and preserving biodiversity and developing green infrastructure is significant and is resilient to changes in the business cycle.’

Comparison between employment in EGSS and the national economy can be presented by NACE groups, e.g. as a bar chart displaying the share of employment in EGSS on total employment.

Figure 11: EGSS employment by NACE, full-time equivalents and share of total employment



Source: Fictitious data set

Green jobs and EGSS employment

According to the International Labour Organization⁽⁷⁴⁾ green jobs are ‘decent’ jobs that contribute to preserve or restore the environment through the production of goods and services that benefit the environment and in more environmentally friendly production processes. They broadly correspond to EGSS employment with the restriction that they must be ‘decent’, i.e. that they also respect specific social requirements, e.g. fair income, security at work place, social protection, etc.⁽⁷⁵⁾

To characterise EGSS employment from the view point of ‘decent’ work would require, in the absence of specific surveys, decent work indicators⁽⁷⁶⁾ to be available or computable at least at the level of NACE divisions or classes. However this is generally not the case, most of these indicators being only produced in the European Statistical System at the level of total employment or population age and sex groups. Furthermore to estimate the share of green jobs in EGSS employment some threshold or criteria for ‘decent’ jobs would be necessary, which are not available at the level of EU countries. It is therefore impossible to determine in which proportion EGSS employment differs from green jobs.

⁽⁷⁴⁾ See http://www.ilo.org/global/topics/green-jobs/news/WCMS_220248/lang-en/index.htm

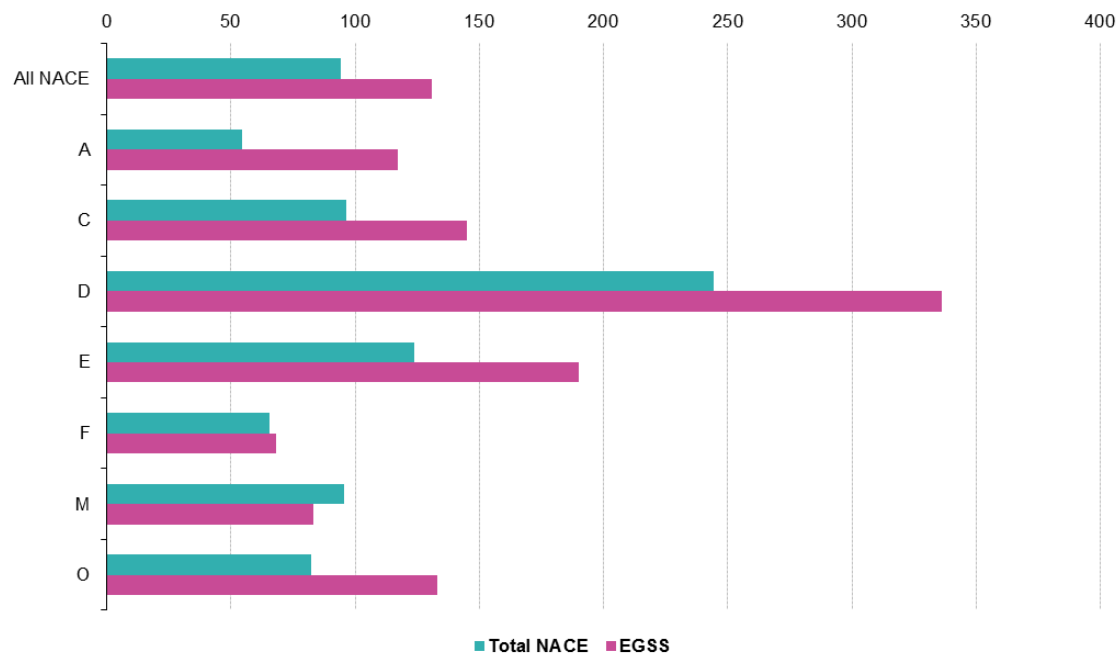
⁽⁷⁵⁾ According to ILO decent work is a work that “is productive and delivers a fair income, security in the workplace and social protection for families, better prospects for personal development and social integration, freedom for people to express their concerns, organize and participate in the decisions that affect their lives and equality of opportunity and treatment for all women and men”. See: <http://www.ilo.org/global/topics/decent-work/lang-en/index.htm>

⁽⁷⁶⁾ See [Decent Work Indicators Concepts and definitions](#) ILO manual first edition 2012

LABOUR PRODUCTIVITY IN EGSS ACTIVITIES

Dividing gross value added by employment provides labour productivity in the EGSS and in the national economy. As an example, Figure 12 compares the ratio 'gross value added by employee (FTE)' (in thousands EUR / FTE) for a selection of NACE categories and for the total economy.

Figure 12: Labour productivity by NACE (thousands EUR/FTE)



Source: Fictitious data set

TIME SERIES

Time series of output, employment, gross value added and exports present the change in time of the environmental sector and its growth. Emphasis can be put on trends, short term developments, comparison with the growth rate of the national economy or employment, evolution of specific industries, etc.

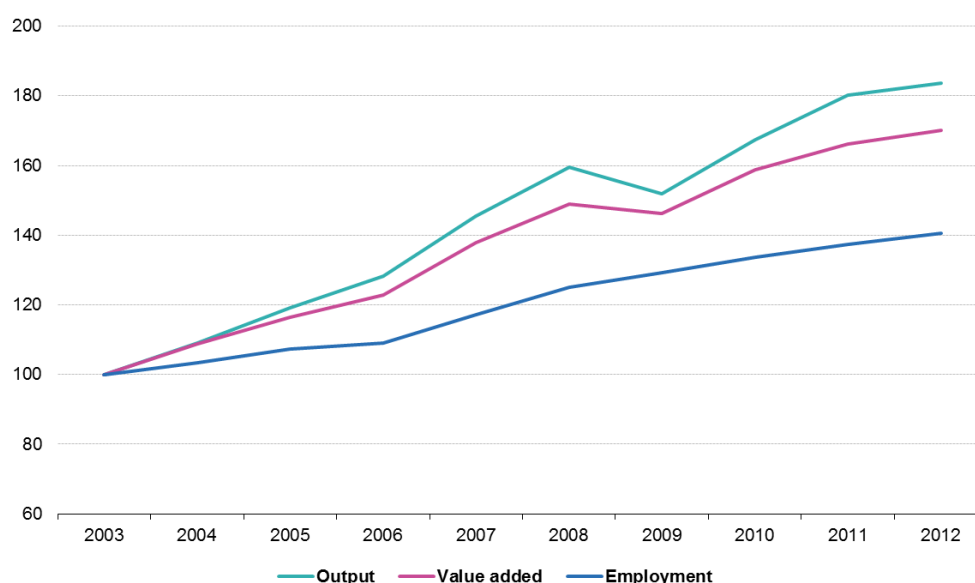
Evolution over time of EGSS characteristics

Time series can be reported in absolute values (euro, FTE), as indices or as growth rates.

Annual time series in absolute values report the value for each year covered by the series and allow the user to compare different years.

Time series of annual indices of a variable relate the values of each year to the value of the same variable in a base year. The base year may be the year when a policy measure was launched or taken as reference.

Figure 13: Evolution of EGSS characteristics, EU-28 (index 2003=100)



Source: Eurostat (online datacode env_ac_egss3)

Annual rates of change compare consecutive years. They are better suited to show short term changes. The term 'growth rates' is applied by default for rates of growth of gross value added (rather than output or employment). Gross value added must be measured at constant prices or chain-linked prices. If measured at current prices, part of the 'growth' shown is actually a price increase (inflation), which is not growth. Presently EGSS measures gross value added at current prices, volume measures should be an area for future development in EGSS in order to provide growth measures. Employment growth does not have this issue because the measurement unit is FTE.

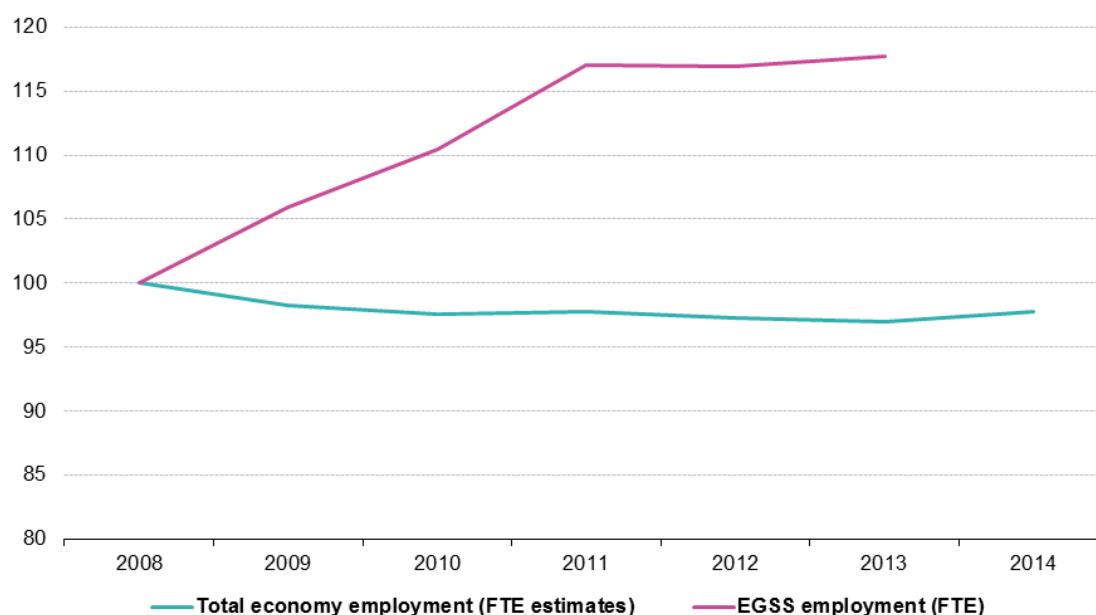
Because indices and growth rates abstract the size and the measurement units from the time series values, different EGSS characteristics can be reported alongside, e.g. value added and employment. Reporting the evolution of different EGSS characteristics in one figure may however be prone to misuse, for instance if chain-linked volume estimates of gross value added are presented alongside output at current prices.

Relating EGSS characteristics with total economy characteristics

Indices and growth rates are also better suited than absolute values to compare the time evolution of EGSS and the total economy because their (very different) relative sizes are not shown. Figure 14 shows the evolution of EGSS and total economy employment.

As the EGSS employment is measured in FTE, comparing the evolution of EGSS employment with employment in the total economy needs a measure of total economy employment in FTE, which is generally not readily available in national accounts. Total employment in FTE in Figure 14 was calculated using the approach in the *EGSS Practical Guide*.

Figure 14: Evolution of EGSS employment compared to employment in the total economy, EU-28 (index 2008=100)



Source: Eurostat (online datacodes nama_10_pe, lfsa_ewhan2, lfsa_epgan2, ewenv_ac_egss1); extracted on 23.03.16

COMPARISONS ACROSS COUNTRIES

All previous indicators can be used to compare the level or structure of EGSS of different countries and with the EU or the euro area. One of the strengths of compilations of EGSS data is indeed that it is an international methodology based on SEEA-CF, which is an international standard. At the same time, EGSS is a relatively recent statistical compilation and the results may not be fully comparable across countries yet.

It can make sense to report EGSS country figures as percentages of the total economy or total employment in order to eliminate the effect of different country sizes (see Table 26). However this presentation may lead to very small figures and the need to publish more than one decimal digit.

Table 27: Share of the environmental domains output over total economy (%)

	Germany	France	Latvia	Romania	Austria
Total environmental protection and resource management activities	2.2	1.6	2.6	2.7	5.8
Total environmental protection activities	1.6	1.0	1.1	1.8	2.0
Protection of ambient air and climate	0.5	0.1	0.0	0.1	0.2
Wastewater management	0.5	0.2	0.2	0.2	0.5
Waste management	0.6	0.4	0.8	1.3	0.7
Protection and remediation of soil, groundwater and surface water	0.0	0.1	0.1	0.1	0.3
Noise and vibration abatement	0.0	0.1	:	0.1	0.1
Protection of biodiversity and landscapes	0.0	:	0.0	0.0	0.0
Protection against radiation	:	0.0	:	:	:
Research and development (R&D) for environmental protection	:	0.1	:	0.0	0.1
Other environmental protection activities	0.0	:	0.0	0.1	0.1
Total resource management activities	0.5	0.6	1.5	0.8	3.8
Management of waters	:	:	:	0.3	0.0
Management of forest resources	:	0.1	:	0.0	0.3
Management of wild flora and fauna	:	:	:	:	0.0
Management of fossil energy resources	0.5	0.3	1.5	0.6	3.0
Production of energy from renewable sources	0.4	0.2	1.5	0.4	2.2
Heat/energy saving and management	0.1	0.0	:	0.1	0.8
Minimisation of the intake of fossil resources as raw material	:	0.0	0.0	0.0	0.0
Management of minerals	:	0.2	:	0.0	0.3
Research and development (R&D) for resource management	:	0.0	:	:	0.1
Other resource management activities	:	:	:	:	0.0

Source: Eurostat (online datacodes env_ac_egss2 last update 09.04.15 extracted on 18.06.15 and nama_10_a64 last update 01.01.15 extracted on 10.06.15)

An alternative approach is to report the share of each country to the EU total. It would be possible to present alongside the share of each country in the EGSS EU total and the share of the country in the corresponding total EU economy, as to underline which countries have large EGSS in relation to their contribution to the EU economy.

LINKING EGSS AND OTHER ENVIRONMENTAL ACCOUNTS DATA

Physical data

Examples of links between EGSS data and physical environmental accounts data are:

- output in organic farming as % of total agricultural output compared with the share of the agricultural area in organic farming in total agricultural area of the country;
- output for the production of renewable energy as a % of total value of energy production compared to the share of renewable energy in the total energy production of the country;
- output of waste management services and waste generation and treatment.

These ratios should be carefully constructed. For example output of EGSS for renewable energy includes not only renewable energy (as a resource efficient product) but also equipment for renewable energy production; on the one side in some countries equipment is mainly exported, on the other side domestic investment for the production of renewable energy may be composed mainly of imported equipment. Therefore the link between output under CReMA 13A and the development of renewable energy in a country may be rather loose.

Comparison should be limited e.g. to the output corresponding to renewable energy products (i.e. excluding equipment). Various categories of output exist in the reporting framework: output in market cleaner and resource efficient products (renewable energy is the main cleaner and resource efficient product in CReMA 13A), but also in ancillary output and output for own final use.

Care should also be taken that the two sets of data are comparable: NACE D output in national accounts not only includes the generation of electric power, natural gas, steam, hot water and the like but also its transport and distribution, whereas in EGSS only the generation is recorded.

Expenditure data

The EPEA module of Regulation (EU) No 691/2011 requires reporting the market, the non-market and the ancillary output of environmental protection services corresponding to the various CEPA domains (see 4.2.1). Despite small differences in the categories of output between the two modules, EPEA data may be an important source for the compilation of EGSS data.

A comparison between the gross fixed capital formation of producers of environmental protection services based on the expenditure accounts and the EGSS output of environmental products of NACE C and F (which are the main producers of equipment and construction for the purpose of EP) would be useful. When completed with foreign trade analysis of equipment this comparison may provide insights on the impact of gross fixed capital formation of producers of environmental protection services on the EGSS output and employment.

Annex 1: Indicative compendium of environmental goods and services and of the economic activities to be covered by Regulation (EU) No 691/2011, Annex V

ENVIRONMENTAL GOODS AND SERVICES

- Organic agricultural (plant and livestock) and aquaculture products and supporting services
- Fuel wood; other wood when complying with sustainability measures
- Rehabilitation of mining sites services
- Drainage water capturing services to prevent groundwater contamination
- Electric and more resource efficient transport equipment; exhaust pipes and their parts (also particles filters)
- Instruments, machinery and apparatus for analysis of pollutants, filtering or purifying gases and liquid
- Septic tanks, perforated buckets and similar articles used to filter water at the entrance to drains; pumps for use in wastewater treatment, vehicles for wastewater collection and sewer cleaning, activated carbon for water-filtering purposes
- Tubes and pipes for wastewater treatment plants as well as for water management
- Sacks and bags for replacing plastic bags; bins, boxes, containers and other receptacles for storing and transporting waste; boards, blocks and similar articles of vegetable fibre, straw or wood waste, agglomerated with mineral binders; incinerators and machinery for waste treatment (e.g. used at landfilling sites)
- Lead containers for radioactive waste
- Maintenance and repair services for reducing water losses
- Specific equipment for the production of energy from renewable sources: e.g. storage systems for biogas, wood fired boilers and other appliances, solar panels and photovoltaic cells, hydraulic turbines and water wheels, wind turbines
- Biofuels
- Charcoal when complying with sustainability measures
- Goods for thermal and noise insulation mainly in buildings: e.g. cork products, windows with three insulating layers, 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
- Reconditioned wooden containers
- Specific equipment produced for environmental protection and resource management products: e.g. thermostats for heating and cooling regulation, thermostatic valves, heat pumps, condensing boilers, solar water heaters
- Discharge lamps as low pressure lamps (e.g. compact fluorescent lamps) and the most efficient domestic appliances
- Reclaimed rubber in primary forms or in plates, sheets or strip, bio-plastic sacks and bags

- Machinery for metal recovery
- Maintenance, repair and installation services for environmental goods
- Electricity, gas and heat from renewable sources
- Desalinated water and collected rainwater; maintenance of water mains for reducing water losses
- Sewerage services: e.g. collecting, transporting and treating wastewater, operation, maintenance and cleaning of sewer systems
- Collection, treatment and disposal services for non-hazardous and hazardous waste
- Nuclear waste treatment and disposal services
- Materials recovery services; secondary raw materials
- Remediation and clean-up services for soil, groundwater and surface water
- Remediation and clean-up services for air
- Other remediation and specialised pollution control services
- Low energy consumption and passive buildings and energetic refurbishment of existing buildings
- Maintenance and repair of water networks
- Wastewater and waste treatment plants and sewage systems
- Renewable energy power plants including installation of photovoltaic panels
- Noise insulation works
- Engineering and architectural services for low energy consumption and passive buildings and energetic refurbishment of existing buildings
- Engineering and architectural services for renewable energy projects
- Engineering and architectural services for water, wastewater and waste management projects
- Technical inspection services of road transport vehicles regarding air emissions
- R&D services for environmental protection and resource management
- Environmental consulting services
- Public litter and collection of garbage from the street
- Administration services for environmental protection and resource management purposes
- Training services in environmental protection and resource management
- Environmental services furnished by membership organisation
- Nature reserve services including wildlife preservation

ENVIRONMENTAL ECONOMIC ACTIVITIES

- Organic agricultural (plant and livestock) and aquaculture activities and supporting services
- Fuel wood; other wood production when complying with sustainability measures
- Rehabilitation of mining sites
- Capturing drainage water to prevent groundwater contamination
- Manufacture of electric and more resource efficient transport equipment; exhaust pipes and their parts (also particles filters)
- Manufacture of instruments, machinery and apparatus for analysis of pollutants, filtering or purifying gases and liquid

- Manufacture of septic tanks, perforated buckets and similar articles used to filter water at the entrance to drains; pumps for use in wastewater treatment, vehicles for wastewater collection and sewer cleaning, activated carbon for water filtering purposes
- Manufacture of tubes and pipes for wastewater treatment plants as well as for water management
- Manufacture of sacks and bags for replacing plastic bags; bins, boxes, containers and other receptacles for storing and transporting waste; boards, blocks and similar articles of vegetable fibre, straw or wood waste, agglomerated with mineral binders; incinerators and machinery for waste treatment (e.g. used at land-filling sites)
- Manufacture of lead containers for radioactive waste
- Maintenance and repair services for reducing water losses
- Manufacture of specific equipment for the production of energy from renewable sources: e.g. storage systems for biogas, wood fired boilers and other appliances, solar panels and photovoltaic cells, hydraulic turbines and water wheels, wind turbines
- Manufacture of biofuels
- Manufacture of charcoal complying with sustainability measures
- Manufacture of goods for thermal and noise insulation mainly in buildings: e.g. cork products, windows with three insulating layers, 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
- Reconditioning of wooden containers
- Manufacture of specific equipment produced for environmental protection and resource management: e.g. thermostats for heating and cooling regulation, thermostatic valves, heat pumps, condensing boilers, solar water heaters
- Manufacture of discharge lamps as low pressure lamps (e.g. compact fluorescent lamps) and the most efficient domestic appliances
- Manufacture of reclaimed rubber in primary forms or in plates, sheets or strip, bio-plastic sacks and bags
- Manufacture of machinery for metal recovery
- Maintenance, repair and installation activities for environmental goods
- Production of electricity, gas and heat from renewable sources
- Desalination of water and collection of rainwater; maintenance of water mains for reducing water losses
- Provision of sewerage services: e.g. collecting, transporting and treating wastewater, operation, maintenance and cleaning of sewer systems;
- Provision of collection, treatment and disposal services for non-hazardous and hazardous waste
- Provision of nuclear waste treatment and disposal services
- Provision of materials recovery services; production of secondary raw materials
- Provision of remediation and clean-up services for soil, groundwater and surface water
- Provision of remediation and clean-up services for air
- Provision of other remediation and specialised pollution control services
- Constructing low energy consumption and passive buildings and energetic refurbishment of existing buildings
- Maintenance and repair of water networks

- Construction work for wastewater and waste treatment plants and sewage systems
- Construction work for renewable energy power plants including installation of photovoltaic panels
- Noise insulation works
- Engineering and architectural services for low energy consumption and passive buildings and energetic refurbishment of existing buildings
- Engineering and architectural services for renewable energy projects
- Engineering and architectural services for water, wastewater and waste management projects
- Technical inspection services of road transport vehicles regarding air emissions
- R&D services for environmental protection and resource management
- Environmental consulting services
- Public litter and collection of garbage from the street
- Administration services for environmental protection and resource management purposes
- Training services in environmental protection and resource management
- Environmental services furnished by membership organisation
- Nature reserve services including wildlife preservation

Annex 2: Operational EGSS list of activities (excerpt)

Environmental activities in indicative compendium	NACE Rev. 2			Class of environmental activity (CEPA/CReMA)						
	CODE	DESCRIPTION	Share of EGSS (h=100%, v=% to be determined)	1	2	...	13A	13B	...	
Manufacture of instruments, machinery and apparatus for filtering or purifying gases and liquid	28.25; 28.29	Manufacture of non-domestic cooling and ventilation equipment; Manufacture of other general purpose machinery n.e.c.	v	X	X	X				
Manufacture of tubes and pipes for wastewater treatment plants as well as for water management	22.21; 23.61; 24.51	Manufacture of plastic plates, sheets, tubes and profiles; Manufacture of concrete products for construction purposes; Casting of iron	v		X					
Manufacture of biofuels	20.14	Manufacture of other organic basic chemicals	v				X			
Provision of sewerage services: e.g. collecting, transporting and treating wastewater; operation, maintenance and cleaning of sewer systems	37	Sewerage	h		X					
Construction low energy consumption and passive buildings and energetic refurbishment of existing buildings	16.23; 41; 43	Manufacture of other builder's carpentry and joinery; Construction of buildings; Specialised construction activities	v					X		
Installation of photovoltaic panels	43.21	Electrical installation	v				X			
Environmental consulting services	74.9	Other professional, scientific and technical activities n.e.c.	v	X	X	X	X	X	X	

The operational list of EGSS products, which provides relevant CPA and CN codes, has a similar layout.

Annex 3: NACE aggregation levels

The national accounts data used for EGSS estimation are mostly available with an A*64 industry breakdown. This aggregation level has to be grouped into the 39 industries of the EGSS voluntary data transmission. Regulation (EU) 691/2011 requires an A*21 breakdown. The correspondence is as follows:

NACE Rev.2 sections	NACE Rev. 2 divisions	A*21 label	EGSS questionnaire		NACE Rev. 2 divisions	A*64 label
A	01-03	Agriculture, forestry and fishing	01-03	Agriculture, forestry and fishing	01	Crop and animal production, hunting and related service activities
					02	Forestry and logging
					03	Fishing and aquaculture
B	05-09	Mining and quarrying	05-09	Mining and quarrying	05-09	Mining and quarrying
C	10-33	Manufacturing	10-12	Manufacture of food products, beverages and tobacco products	10-12	Manufacture of food products, beverages and tobacco products
			13-15	Manufacture of textiles, wearing apparel and leather products	13-15	Manufacture of textiles, wearing apparel and leather products
			16-18	Manufacture of wood and paper products, and printing	16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plating materials
					17	Manufacture of paper and paper products
					18	Printing and reproduction of recorded media
			19	Manufacture of coke and refined petroleum products	19	Manufacture of coke and refined petroleum products
			20	Manufacture of chemicals and chemical products	20	Manufacture of chemicals and chemical products
			21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	21	Manufacture of basic pharmaceutical products and pharmaceutical preparations
			22-23	Manufacture of rubber and plastic products, and other non-metallic mineral products	22	Manufacture of rubber and plastics products
					23	Manufacture of other non-metallic mineral products
			24-25	Manufacture of basic metals and fabricated metal products, except machinery and equipment	24	Manufacture of basic metals
			26	Manufacture of computer, electronic and optical products	25	Manufacture of fabricated metal products, except machinery and equipment
					26	Manufacture of computer, electronic and optical products
			27	Manufacture of electrical equipment	27	Manufacture of electrical equipment
			28	Manufacture of machinery and equipment n.e.c.	28	Manufacture of machinery and equipment n.e.c.
			29-30	Manufacture of transport equipment	29	Manufacture of motor vehicles, trailers and semi-trailers
					30	Manufacture of other transport equipment
			31-32	Manufacture of furniture; other manufacturing; repair and installation of machinery and equipment	31-32	Manufacture of furniture; other manufacturing
			33		33	Repair and installation of machinery and equipment
D	35	Electricity, gas, steam and air conditioning supply	35	Electricity, gas, steam and air-conditioning supply	35	Electricity, gas, steam and air conditioning supply
E	36-39	Water supply; sewerage, waste management and remediation activities	36	Water collection, treatment and	36	Water collection, treatment and supply
			37	Sewerage	37-39	Sewerage; waste collection, treatment and disposal activities; materials recovery; remediation activities and other waste management services
			38	Waste collection, treatment and disposal activities; materials recovery		
			39	Remediation activities and other waste management services		
F	41-43	Construction	41-43	Construction	41-43	Construction

NACE Rev.2 sections	NACE Rev. 2 divisions	A*21 label	EGSS questionnaire		NACE Rev. 2 divisions	A*64 label
G	45-47	Wholesale and retail trade; repair of motor vehicles and motorcycles	45-47	Wholesale and retail trade; repair of motor vehicles and motorcycles	45	Wholesale and retail trade and repair of motor vehicles and motorcycles
					46	Wholesale trade, except of motor vehicles and motorcycles
					47	Retail trade, except of motor vehicles and motorcycles
H	49-53	Transportation and storage	49-53	Transportation and storage	49	Land transport and transport via pipelines
					50	Water transport
					51	Air transport
					52	Warehousing and support activities for transportation
					53	Postal and courier activities
I	55-56	Accommodation and food service activities	55-56	Accommodation and food service activities	55-56	Accommodation; food and beverage service activities
J	58-63	Information and communication	58-63	Information and communication	58	Publishing activities
					59-60	Motion picture, video and television programme production, sound recording and music publishing activities; programming and broadcasting activities
					61	Telecommunications
					62-63	Computer programming, consultancy and related activities; information service activities
K	64-66	Financial and insurance activities	64-66	Financial and insurance activities	64	Financial service activities, except insurance and pension funding
					65	Insurance, reinsurance and pension funding, except compulsory social security
					66	Activities auxiliary to financial services and insurance activities
L	68	Real estate activities	68	Real estate activities	68	Real estate activities
						of which: imputed rents of owner-occupied dwellings
M	69-75	Professional, scientific and technical activities	69-70	Legal and accounting activities; activities of head offices;	69-70	Legal and accounting activities; activities of head offices; management consultancy activities
			71	Architecture and engineering activities; technical testing and analysis	71	Architecture and engineering activities; technical testing and analysis
			72	Scientific research and development	72	Scientific research and development
			73-75	Advertising and market research; other professional, scientific and technical activities; veterinary	73	Advertising and market research
					74-75	Other professional, scientific and technical activities; veterinary activities
N	77-82	Administrative and support service activities	77-82	Administrative and support service activities	77	Rental and leasing activities
					78	Employment activities
					79	Travel agency, tour operator reservation service and related activities
					80-82	Security and investigation activities; services to buildings and landscape activities; office administrative, office support and other business support
O	84	Public administration and defence; compulsory social security	84	Public administration and defence; compulsory social security	84	Public administration and defence; compulsory social security
P	85	Education	85	Education	85	Education
Q	86-88	Human health and social work activities	86-88	Human health and social work activities	86	Human health activities
					87-88	Social work activities

NACE Rev.2 sections	NACE Rev. 2 divisions	A*21 label	EGSS questionnaire	NACE Rev. 2 divisions	A*64 label
R	90-93	Arts, entertainment and recreation	90-93 Arts, entertainment and recreation	90-92	Creative, arts and entertainment activities; libraries, archives, museums and other cultural activities; gambling and betting activities
				93	Sports activities and amusement and recreation activities
S	94-96	Other service activities	94-96 Other service activities	94	Activities of membership organisations
				95	Repair of computers and personal and household goods
				96	Other personal service activities
T	97-98	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	97-98 Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	97-98	Activities of households as employers of domestic personnel and undifferentiated goods and services production of households for own use
U	99	Activities of extra-territorial organisations and bodies	99 Activities of extraterritorial organisations and bodies	99	Activities of extraterritorial organizations and bodies

Annex 4: CEPA – definitions, explanations, examples of environmental protection activities

This annex presents definitions and explanatory of environmental protection activities for the classes of the Classification of Environmental Protection Activities (CEPA). CEPA it is a generic, multi-purpose, functional classification. CEPA is included in SEEA-CF, Annex I.

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. 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 radionuclide 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 24 of ISIC/NACE (Manufacture of fertilisers and nitrogen compounds) is excluded.

Division 37 of ISIC/NACE defines recycling as "the processing of waste, scraps whether or not used, into a form feasible to be transformed in new raw materials. Typical is that, in terms of commodities, both input and output consist of waste and scrap, the input being sorted or unsorted but always unfit for further direct use in an industrial process whereas the output is made fit for further processing and is to be considered then as an intermediate good. A process is required, either mechanical or chemical". The main purpose of activities classified in division 37 of ISIC/NACE is the manufacture of secondary raw materials but there may be important secondary waste management activities.

Compost and secondary raw materials (as well as products made of secondary raw materials) are not

considered environmental protection products. Their use is excluded.

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.

Excluded are wastewater management activities (see CEPA 2), as well as activities aimed at the protection of biodiversity and landscape (see CEPA 6).

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 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, etc.), in 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 forest 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 radionuclide 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

Any material that contains or is contaminated with radionuclides at concentrations or radioactivity levels greater than the "exempt quantities" established by the competent authorities, and for which no use is foreseen. Radioactive wastes are 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 radionuclides 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 5: CReMA – definitions, explanations, examples of resource management activities

This annex presents definitions, explanatory notes and examples of resource management activities for the classes of the Classification of Resource Management Activities (CReMA). The examples are the result of task force and working group discussions, as well as data collection experiences in the countries.

Like CEPA it is a generic, multi-purpose, functional classification. CReMA has been developed by Eurostat Task Forces.⁽⁷⁷⁾

CReMA is devoted to the description of measures and activities carried out to preserve, maintain and enhance the stock of natural resources and safeguard those resources against depletion.

The classification has been developed consistently with the classification principles of the CEPA. CReMA cross classifies the different kinds of activities carried out to manage natural resources. Categories are built complementarily with CEPA but without any overlapping with CEPA classes.

CREMA 10: MANAGEMENT OF WATER

Management of water comprises activities aimed at the minimisation of inland waters intake through in-process modifications, the reduction of water losses and leaks or reduction of the intake by substituting the resource with alternative resources, water reuse and savings. Restoration activities (recharge of groundwater bodies) are included as well as the measurement, control, laboratories and the like and education, training and information and general administration activities linked to the management of inland waters and water saving.

Activities related with the maintenance of the quality of water bodies are excluded (see CEPA 4). Collection, treatment and distribution of water should be in principle excluded. However, if the available data sources do not allow separating them out, they can be included under CReMA 10 and an explanation should be given in the metadata supplied with the statistics.

Reduction of the intake of water resources

Activities aimed at the reduction of the intake through in-process modifications related to the reduction of the water input for the production process. This includes all the kinds of replacement or adjustment of production processes aiming at reducing the water input needed for producing a certain output (closed – circuit cooling systems). Desalinization of seawater as well a rainwater recovery is included.

Reduction of water losses and leaks, water reuse and savings

Activities aimed at the reduction of water use through the reduction of water losses and leaks or the installation of facilities, systems and equipment for water reuse and savings, replacement of pipes, drop irrigation, recirculation of water, washing machine using less water etc.

Replenishment of water resources

Activities aimed at increasing water available in water stocks. The following activities are included: recharge of groundwater bodies to increase/restore water stocks; land improvement, development of vegetal cover in order to increase water infiltration and recharge underground water bodies. If any such activities are, however, performed for the main purpose of improving water quality, fighting water salinity, e.g. in coastal areas or protection of soil against erosion e.g. in mountainous areas, they should be classified under CEPA 4.

Measurement, control, laboratories and the like related to water resources

Activities aimed at measuring, controlling and monitoring the use and the level of water stocks. The following activities are excluded: measurement, monitor and control of the concentration of pollutants in wastewater and the quality of the inland water and marine water at the place wastewater is discharged (CEPA 2); measurement, monitor and control of the quality of surface water and groundwater (CEPA 4).

Other activities for the management of water resources

⁽⁷⁷⁾ Important inputs to develop the CReMA also came from work by Istat (Ardi, C. and Falcitelli, F., The Classification of Resource Use and Management Activities (CRUMA) and Expenditure, Istat, Rome, 2007)

All other activities and measures aimed at the management of water resources. These include regulation, administration, education, and training and information activities specific to the class when they can be separated from other activities related to the same class and from similar activities related to other classes. They include, for example: information campaigns to encourage water savings; release of licences for water abstraction; and general government units or parts thereof that administer and regulate the use of water resources or are responsible for water saving policies.

CREMA 11: MANAGEMENT OF FOREST RESOURCES

The management of forest resources as natural resources should in theory only deal with “non-cultivated forest areas and related timber stocks, i.e. forests areas not available for wood supply (either because they are protected or because the harvest is uneconomic due to the low productivity or to high harvesting and transport cost) and natural forest areas and corresponding timber.

However there are few natural forests in European Union countries. Furthermore activities related with protected forest are included in the CEPA 6 protection of biodiversity and landscape.

Therefore it has been decided by the ReMEA Task Force⁽⁷⁸⁾ to extend the scope of management of forest resources to both naturally regenerated forests and planted forests and to focus on timber resources.

Collection of wood (logging) and wild growing non wood forest products is excluded; however production of fuel wood is included in CReMA 13A.

CREMA 11A: MANAGEMENT OF FOREST AREAS

It includes restoration or replenishment activities or development of new forest areas (reforestation and afforestation) as well as the prevention and control of forest fires, diseases, pests, and weeds, etc. Activities and products aimed at measuring, controlling and monitoring forest areas and timber stocks, laboratories and the like are also included as well as education, training and information and general administration activities linked to the management of forests.

Activities concerning the protection and restoration of forests as habitats, ecosystems and landscapes are excluded, in particular protection of forests against forest fires for biodiversity or landscape protection purpose (forests areas not available for wood supply), classified under CEPA 6).

CREMA 11B: MINIMISATION OF THE INTAKE OF FOREST RESOURCES

Reduction of the intake through in-process modifications related to the reduction of the input of timber resources for the production process. This includes all the kinds of replacement or adjustment of production processes aimed at reducing the input of forest-related products (wood and non-wood) needed for producing a certain output (wood saving saws, more efficient wood stoves and furnaces). It also includes the recovery, reuse or savings of forest products and by-products as well as the substitution of forest products with other materials and substances. Non wood forest products are mushrooms, truffles, berries, nuts, balata and other rubber-like gums, cork, lac and resins, balsams, vegetable hair, eelgrass, acorns, horse chestnuts, mosses and lichens.

CREMA 12: MANAGEMENT OF WILD FLORA AND FAUNA

Management of wild flora and fauna comprises activities aimed at the minimisation of the intake of wild flora and fauna (wild growing forest products are excluded) through in-process modifications as well as withdrawals reduction and regulation measures. Restoration activities are included (replenishment of wild flora and fauna stocks). Activities and products concerning measurement, control, laboratories and the like are also included as well as education, training and information and general administration activities linked to the management of wild flora and fauna.

The focus is on wild flora and fauna and all the activities carried out for their maintenance and management. Often the management of game reserves, e.g. in the case of birds, has the purpose of maintaining the stock of wild fauna, even if for hunting purposes. What is relevant is that the flora and fauna concerned are wild and the activities are aiming mainly at maintaining the resource functions (SEEA concept) of wild flora and fauna, e.g. aquaculture and fish farming are included.

CEPA 6 relates to the protection of biodiversity which concerns essentially threatened species. In the field of flora and fauna resources (CReMA 12), what is relevant is the stock of e.g. fish and wild animals.

⁽⁷⁸⁾ Eurostat (2013): Minutes of the meeting of the task force on the resource management expenditure account (ReMEA)

CREMA 13: MANAGEMENT OF ENERGY RESOURCES

Management of energy resources comprises activities aimed at the minimisation of the intake of fossil resources through the production of energy from renewable sources, heat/energy saving and management and the minimisation of the intake of fossil resources for raw materials for uses other than energy production.

Exploitation, management and maintenance of the stocks of non-renewable energy sources (including exploration and discovery of new reserves) are not included in the scope of the EGSS. Also excluded are measures that improve the efficiency of energy resources extraction.

CREMA 13A: PRODUCTION OF ENERGY FROM RENEWABLE SOURCES

It includes the production of energy from renewable sources, as well as related measurement, control, inventories of renewable energy sources (wind, solar, geothermal...) and the like, administration, formation, information, etc. activities.

The directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources lists the following sources for the production of renewable (non-fossil) energy: wind, solar, aero-thermal, geothermal, hydrothermal and ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases. Bio-fuels are included under biomass; biomass means the biodegradable fraction of products, waste and residues from biological origin from agriculture (including vegetal and animal substances), forestry and related industries including fisheries and aquaculture, as well as the biodegradable fraction of industrial and municipal waste.

It includes the production of energy from burning biomass waste when the purpose is energy recovery. However if the main purpose of waste incineration is the thermal treatment of waste in waste treatment facilities then the activity is included in CEPA 3.

Production of electricity and heat from renewable sources: it includes production of electricity from wind, production of heat from geothermal sources (either for industrial uses or for heating of dwellings), production of bio-fuels for transport, production of biogas, etc. According to the ReMEA guidelines, fuel wood production when complying with sustainability measures e.g. Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC) standards, could be included. Wood pellets and other wood or vegetal based energy products are also included. Production of renewable energy as non-market output for own use by households and as secondary output by producers classified in other industries is also included⁷⁹.

Measurement, control, laboratories and the like related to renewable energy. This group includes activities aimed at measuring, controlling and monitoring the production of renewable energy. It includes for example inventories and assessments of renewable energy potentials.

Other activities for renewable energy management include all other activities and measures aimed at the management of renewable energy. It includes regulation, administration, education, training and information activities specific to renewable energy when they can be separated from other activities related to the same RM class and from similar activities related to other RM classes.

CREMA 13B: HEAT/ENERGY SAVING AND MANAGEMENT

Activities aiming at the minimisation of the intake of non-renewable energy sources through in-process modifications as well as the minimisation of heat and energy losses and through energy savings; activities and products concerning measurement, control, laboratories and the like are also included as well as education, training and information and general administration activities linked to the management and saving of heat and energy.

Energy savings through in-process modifications: this includes all the kinds of replacement or adjustment of production processes, including energy production processes, aiming at reducing the use of energy for producing a certain output (combined heat and power production) These activities are mainly carried on as ancillary (own account) activities. They also include heat and electricity co-generation, reducing losses in energy transportation, improvement of energy efficiency, etc.

Insulation activities: they include all activities aimed at reducing the need of energy for lighting, heating and

⁽⁷⁹⁾ According to NACE Rev. 2 (see paragraph 53 d): production of energy ... even if the whole output is consumed by the parent unit is not to be considered as ancillary production. Therefore renewable energy production of enterprises for auto consumption should be accounted for as secondary production

cooling buildings.

Energy recovery: it includes energy recovery from non-renewable sources (e.g. non-biodegradable waste); production of energy from renewable sources is excluded as well as the direct production of energy from fossil fuels.

Measurement, control, laboratories and the like related to energy saving. This group includes activities aimed at measuring, controlling and monitoring the reduction in the use of energy. It includes for example audit, production of energy performance certificates and assessments of energy savings potentials.

Other activities for energy savings include all other activities and measures aimed at the reduction of the use of energy such as regulation, administration, education, training and information activities specific to the class when they can be separated from other activities related to the same class and from similar activities related other classes. This includes also actions and activities aimed at reducing energy consumption through modal shift and transport behavioural/organisational changes.

CREMA 13C: MINIMISATION OF THE INTAKE OF FOSSIL ENERGY RESOURCES AS RAW MATERIAL

Activities aiming at the minimisation of the intake of fossil energy resources for uses other than energy production (e.g. the production of plastics, chemicals, rubber); activities and products concerning measurement, control, laboratories and the like are also included as well as education, training and information and general administration activities linked to the management and saving of fossil resources used as input for productions other than energy production.

Savings through in-process modifications: this includes all the kinds of replacement or adjustment of production processes, aiming at reducing the use of fossil energy resources for uses other than energy production. These activities are mainly carried on as ancillary (own account) activities.

Recovery of non-energetic fossil fuels based materials: it includes the processing of petro-based materials waste and scrap and other articles into secondary raw (plastic recovery equipment)

Production of substitute for fossil fuels based materials: it includes production of bio materials, bio plastics, etc.

Measurement, control, laboratories and the like related to the reduction of the use of fossil fuel for uses other than energy production. This group includes activities aimed at measuring, controlling and monitoring the reduction of the use of fossil fuel for uses other than energy production.

Other activities include all other activities and measures aimed at the reduction of the use of fossil fuel for uses other than energy production such as regulation, administration, education, training and information activities specific to the class when they can be separated from other activities related to the same class and from similar activities related other classes.

CREMA 14: MANAGEMENT OF MINERALS

A mineral is a naturally occurring substance generally solid, inorganic and a-biogenic. Excluded from the management of minerals are activities related to the management of biological natural resources, water, and fossil energy resources.

Management of minerals comprises activities aimed at the minimisation of the intake of minerals through in-process modifications as well as the reduction of scraps and the production of minerals secondary raw materials. Activities and products concerning measurement, control, laboratories and the like are also included as well as education, training and information and general administration activities linked to the management of minerals.

Exploitation, management and maintenance of the stocks of mineral resources (including exploration and discovery of new reserves) are excluded from the scope of the EGSS. Also excluded are measures and activities that improve the efficiency of mineral resources extraction.

Savings through in-process modifications: this includes all the kinds of replacement or adjustment of production processes, aiming at reducing the use of mineral resources. These activities are mainly carried on as ancillary (own account) activities.

Recovery of mineral based materials: it includes the processing of metallic and non-metallic mineral materials waste and scrap and other articles into secondary raw materials.

- mechanical crushing of metal waste from used cars, washing machines, bikes etc.
- mechanical reduction of large iron pieces such as railway wagons
- shredding of metal waste, end-of-life vehicles etc.
- other methods of mechanical treatment as cutting, pressing to reduce the volume
- reclaiming metals out of photographic waste, e.g. fixer solution or photographic films and paper
- crushing, cleaning and sorting of glass
- crushing, cleaning and sorting of other waste such as demolition waste to obtain secondary raw material

Production of substitute for minerals based materials: manufacturing of vegetal substitutes for cement, stone and plaster.

Measurement, control, laboratories and the like related to the reduction of the use of minerals. This group includes activities aimed at measuring, controlling and monitoring the reduction of the use of minerals.

Other activities include all other activities and measures aimed at the reduction of the minerals such as regulation, administration, education, training and information activities specific to the class when they can be separated from other activities related to the same class and from similar activities related other classes.

CREMA 15: RESEARCH AND DEVELOPMENT ACTIVITIES FOR RESOURCE MANAGEMENT

Research and development activities for natural resource management 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 in the field of natural resource management and savings: R&D for renewable energy, for energy and minerals savings, for timber and other biological resources savings, etc.

Excluded are R&D activities related to environmental protection (see CEPA 8)

CREMA 16: OTHER RESOURCE MANAGEMENT ACTIVITIES

Natural resource management activities not classified in the previous classes, i.e. general administration, education, training and information activities that relate to two natural resources or more, as well as other kinds of activities leading to indivisible output.

Excluded are general administration, education, training and information activities related mainly to environmental protection (see CEPA 9).

General administration of natural resources

It includes any identifiable activity that is directed towards the general support of decisions taken in the context of natural resource management whether by governmental or by nongovernmental units.

General administration, regulation and the like: any identifiable activity within general government and NPISH units that is directed towards regulation, administration of the environment and the support of decisions taken in the context of natural resource management activities. When possible, such activities should be allocated to CREMA classes 10-14. If this is impossible, they should be included under this position of the classification

Environmental management: any identifiable activity of corporations that is directed towards the general support of decisions taken in the context of natural resource management activities. This includes the preparation of declarations or requests for permission, internal environmental management, and environmental certification processes (ISO 14000; EMAS), as well as the recourse to environmental consultancy services. Activities of units specialized in environmental consultancy, supervision and analysis are included. When possible, such activities should be allocated to CREMA classes 10-14. If this is impossible, they should be included under this position of the classification.

If the general administration activities concern both environmental protection and management of natural resources, they should be broken down between this position and the corresponding category of the CEPA. If this is impossible, they should be classified in this position or, alternatively, in the one of the CEPA group according to the main purpose criterion; if this is impossible as well, they should be classified within the corresponding category of the CEPA group.

Education, training and information

It includes activities that aim at providing general environmental education or training and disseminating information on natural resource management. Included are high school programmes, university degree programmes or special courses specifically aimed at training for natural resource management. Activities such as the production of environmental reports and environmental communication are also included. When possible, such activities should be allocated to CEPA classes 10-14. If this is impossible, they should be included under this position of the classification.

If the general education, training and information activities concern both environmental protection and management of natural resources, they should be broken down between this position and the corresponding category of the CEPA 9.2. If this is impossible, they should be classified in this position or, alternatively, in the one of the CEPA group according to the main purpose criterion; if this is impossible as well, they should be classified within the corresponding category of the CEPA group 9.2.

Activities leading to indivisible expenditure

Natural resource management activities that lead to indivisible expenditure, i.e., that cannot be allocated to any other class of the RM group.

Activities not elsewhere classified

This class comprises all resource management activities that cannot be classified under other classes of the RM group.

Annex 6: 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 the production of cleaner and more resource efficient transport and other equipment, it may be difficult to determine whether the equipment is cleaner (EP: e.g. less emissions of air pollutants or noise) or more resource efficient (RM: e.g. less consumption of energy).

This handbook proposes the following rule:

If the equipment is specifically designed for reducing air and noise emissions (e.g. electric cars) its production should be recorded under EP. In this case, if it is not possible to identify CEPA 5 (noise and vibration abatement) as main EP purposes, 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 devices) it should be recorded under RM and therefore be classified under the CReMA activities.

CEPA 2 / CReMA 13B – CReMA 14

Sewage sludge

Sewage sludge is a residual of wastewater cleaning. Sewage sludge can be used for RM. When used as fertilizer in agriculture it 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:

- If sewage sludge is processed before being used in agriculture (e.g. decontamination, special processing to increase the nutrient availability for crops) this treatment activity may be recorded as RM and classified 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 sewage sludge (either sold or for own use) should be recorded under CEPA 2. Also the value of unprocessed sewage sludge (either sold or for own use) should be recorded under CEPA 2.

CEPA 3 / CReMA 11B – CReMA 13B – CReMA 14

There are some activities closely related with waste management, which, however, contribute to RM. Such activities are the recovery of raw materials from waste, the production of energy from waste (by incineration or the production of biogas and biofuels from waste) and composting.

In line with SEEA-CF 2012, Annex I, section A.I, the composting and the recovery of materials may be carried out for the purpose of EP. For example, if the main purpose of these activities is avoiding other forms of waste disposal, these activities should fall under CEPA 3.

As an operational rule, *recovery of raw materials from waste and composting*:

- should be recorded as RM and therefore be 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 RM and therefore be 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.

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 Annex I, section A.I). In addition, the production of thermal energy from waste can also help avoiding the depletion of fossil energy resources. Therefore, as an operational rule waste incineration:

- should be recorded as RM and therefore be 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 RM and therefore be classified under the CReMA activities 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.

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.

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 RM hold). If, for example, material recovery is performed by a unit classified under NACE 38.2 (waste treatment and disposal) it may not be possible 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, these activities are to be recorded under RM (even if the above conditions for recording them under RM 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 not be possible to separate out the output value of biogas produced from waste.

In EGSS accounts also the production of specific equipment used for these activities and their installation are recorded. In principle the allocation of this equipment and installation works to CEPA and CReMA activities should follow the allocation of the underlying EP and RM activities using them. If due to data limitations this principal rule cannot be followed, the following operational rules are recommended:

- Special equipment and installation for waste incineration (including parts that serve the recuperation of energy) fall under CEPA 3.
- Special equipment and installation for composting fall under CEPA 3.
- Special equipment and installation for producing biogas and biofuels fall under CReMA 13A.

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 and the production and installation of 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 RM 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 7: Examples of services according to Extended Balance of Payments Services Classification relevant for EGSS

Extended Balance of Payments Services Classification (EBOPS 2010)		CPA (2008) correspondence	
2	Maintenance and repair services	33	Repair and installation of machinery and equipment
5	Construction	Section F Construction	
5.1	Construction abroad		
10.1	RD services		
10.1.1.1	Provision of customized and non-customized R&D services	72.1	R&D services on natural sciences and engineering
10.1.2	Other R&D services	71.2	Technical testing and analysis services
10.3.1	Architectural engineering scientific and other technical services		
10.3.1.1	Architectural services	71.11	Architectural services
10.3.1.2	Engineering services	71.12	Engineering services
10.3.1.3	Scientific and other technical services	74.90.13	Environmental consulting services
10.3.2	Waste treatment and depollution, agricultural and mining services		
10.3.2.1	Waste treatment and depollution	37	Sewerage services
		38	Waste collection, treatment and disposal services; materials recovery services
		39	Remediation services and other waste management services
		81.2	Cleaning services
10.3.5	Other business services	74.90.2	Other professional, technical and business services, n.e.c.

Source: Eurostat: RAMON - Reference And Management Of Nomenclatures. Correspondence table between CPA 2008 and EBOPS 2010

Annex 8: Possible improvements of EGSS

This annex lists some areas identified for improvement in the next years.

DEFINITION OF THE EGSS SCOPE AND RELATIONS WITH CLASSIFICATIONS

Defining the scope of EGSS, i.e., what constitutes the environmental subset, is far from straightforward. Recent years have seen important advancements in this sense, which resulted in the Commission Implementing Regulation (EU) 2015/2174 on the indicative compendium of environmental goods and services. This act states the list of economic activities and products that constitute the core scope of EGSS at European level. There has also been progress on two related areas: first, how to ensure a harmonised application of these lists while allowing flexibility for country differences (i.e., how countries can adapt the European core scope to national circumstances); secondly, how to link the indicative compendium to existing classification systems and available data sources. These issues were discussed in the April 2016 meeting of the working group on environmental expenditure statistics.

This work however must continue. In the next years the system to assess and monitor such flexible implementation needs to be set up. It will be based on quality reports. More experience is needed. Another aspect that will be developed is the link with existing classifications, e.g. NACE and CPA, in particular to identify the EGSS subset using the existing classification systems and available data sources. It would lead to development of the operational lists discussed and maintained at the level of the working group environmental expenditure accounts.

INTEGRATED FRAMEWORK WITH EPEA AND OTHER MONETARY ENVIRONMENTAL ACCOUNTS

The working group on environmental expenditure statistics discussed in 2014 and 2015 how to streamline the production of EGSS, EPEA, environmental taxes and other possible environmental accounts. The purpose is both to create efficiency gains and to improve the quality of the estimates with cross-checks between different modules. This work led to a conceptual reflection on the overlaps and differences across modules, the so-called integrated framework, and it is reflected in the handbook (in particular in section 2.1 and Annex 9). Whereas this conceptual reflection is not complete yet, it is necessary at this point to complement the advancements in the theory with some practical experiences. It would be important that countries experiment the production of EGSS and EPEA as part of an integrated system. The experience gained would be most valuable to continue streamlining the theory and practice of those accounts.

CONSTANT PRICES OR CHAIN LINKED VOLUME MEASURES

As indicated in Chapter 5 reporting evolution over time of the monetary EGSS characteristics in current prices may be misleading.

Although neither SEEA-CF 2012 nor Regulation (EU) No 691/2011 introduce the measurement of EGSS monetary characteristics at constant prices or chain linked volume, for some analyses (e.g. presenting the evolution of labour productivity 'GVA/employment' or linking monetary to physical data) and for comparisons of EGSS' growth rate with the growth rate of the total economy it is more relevant to use constant prices or chain linked volumes. Ideally they would be measured in the same way as national accounts main characteristics, namely output, gross value added, GDP and labour productivity.

ESA Chapter 10 gives the guidance for the construction of constant prices or volume measures.⁽⁸⁰⁾

Although there are numerous environmental goods and services the construction of a measure of EGSS output at constant price may be rather straightforward; experience shows that EGSS output concentrates on market products and within these markets on few products easily identifiable: waste water and waste collection and treatment services, renewable energy and equipment for the production of renewable energy, construction works, secondary raw products and some other cleaner or resource efficient products. For these products constant price output measures may be rather easy to obtain, either because they already

⁽⁸⁰⁾ See also Handbook on prices and volume measures in national accounts Eurostat 2016
<http://ec.europa.eu/eurostat/documents/3859598/7152852/KS-GQ-14-005-EN-N.pdf/839297d1-3456-487b-8788-24e47b7d98b2>

exist in national accounts (e.g. products of NACE 37, 38 and 39) or because their output value is calculated by price-times quantity methods (renewable energy and some other cleaner and resources efficient products) or because product prices are specifically monitored by professional organisations, specialised sites or organisms (e.g. prices of equipment for the production of renewable energy).

The main difficulty may be encountered for those products for which quality improves rapidly as the change in quality has to be taken into account when calculating the volume change, e.g. electric cars when their range autonomy increases.

Calculation of constant prices measure of gross value added is more complicated: gross value added in volume is defined as the difference between output in volume terms and intermediate consumption in volume terms. Some simplifications to the theoretically correct 'double deflation' method are exposed in ESA paragraph 10.33.

A more modest, practical compromise for volume measures of EGSS output and value added consists of using the price deflators from National Accounts, i.e. the ratio between the corresponding National Accounts aggregates (output, value added) at current prices and at constant prices, and apply those ratios to EGSS (output, value added) at current prices. This can be done by NACE or for the whole economy. This method is imperfect because it assumes that the price evolution of the EGSS is the same as of the National Accounts aggregates. The error introduced is smaller if this approach is used by NACE than for the whole economy. Whereas this method is imperfect, it is much simpler than a proper calculation of constant prices e.g. using double deflation methods and it does not require calculation nor data sources about price evolution of EGSS products.

EARLY ESTIMATES

Policymakers and other users of environmental accounts request early estimates of EGSS. This increases the relevance of the data and its analysis. In subparagraph 9 the preambles of the Regulation (EU) No 691/2011 calls the attention on the fact that "more timely data could also be produced by now-casting, which uses statistical techniques similar to those used in forecasting to make reliable estimates".

More timely data may be an aim of NSI for national data or of Eurostat for EU estimates. The following paragraphs provide some indications on the basis for compiling such earlier estimates.

According to Regulation (EU) No 691/2011, EGSS data should be transmitted to Eurostat at the end of second year after the reference year t (i.e. at $t+24$ months). They are published a few months later, once the validation process is completed. However many of the data used for EGSS estimates are available earlier than $t+24$:

- ESA transmission program data used for EGSS: tables by industry ($t+9$ months at the A*21 level which distinguishes NACE sections and $t+21$ months at the A*64 level), general government expenditure by function ($t+12$ months);
- Prodcom data are to be sent to Eurostat at $t+6$ months and SBS data are available at $t+12$ months;
- Labour Force Survey results are published approximately at $t+14$ weeks;
- Extra EU detailed external trade data by products are available 40 days after the reference month and intra-EU detailed statistics 70 calendar days after the reference month;
- Annual energy data are transmitted by countries to Eurostat at $t+11$ months;
- Organic farming: countries are required to provide data at $t+6$ months.

If EGSS data are compiled using mostly sources available earlier than at $t+24$ months, it may be possible to compile also earlier estimates of EGSS data for reference year t .

It may be that EGSS also uses other data sources that become available later. This would create data gaps in the estimation process. Data gaps of limited size may be overcome using ratios from previous years or simple methods of gap-filling (e.g. trend analysis). Those early estimates may be replaced later once the whole set of data sources becomes available for the reference year. For example, if early estimates for the reference year t are compiled at $t+12$ months, they may be revised at $t+24$ months with final estimates.

Annex 9: Integrating EGSS and other environmental accounts

The EGSS accounts are part of the set of monetary environmental accounts following the SEEA-CF framework. Some monetary environmental accounts are covered in Regulation (EU) No 691/2011 whereas others don't. In the former group there are: EGSS, environmental taxes and environmental protection expenditure accounts (EPEA). Monetary environmental accounts without legal basis are environmental subsidies (under development, voluntary data collection in place since 2015) and resource management expenditure accounts (ReMEA; under development and no European data collection yet).

Important interrelations exist between EGSS and EPEA and this Annex focuses mostly on them.

EGSS accounts analyse the environmental protection and resource management activities from the supply side, i.e., production of environmental activities. The environmental protection expenditure accounts (EPEA) analyse the environmental protection from the use side, i.e. expenditure for environmental protection complemented with information on output, costs of production and transfers. Both EGSS and EPEA are underpinned by the SEEA-CF conceptual framework, and follow the definitions, and recording rules of national accounts. Therefore EGSS and EPEA trace 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.

Two questions arise: first, how well do EGSS and EPEA conceptually fit as part of an integrated framework of monetary accounts? Secondly, how to get advantage of such commonalities in the production processes, e.g. to achieve efficiency gains? These two aspects are addressed in the next two sections.

Conceptual relationship between EGSS and EPEA

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

Table AN9-1: main features of EGSS and EPEA compared⁽⁸¹⁾

	EGSS	EPEA
Scope activities		
- Conceptual	SEEA-CF: Environmental protection and resource management	SEEA-CF: Environmental protection only
- Operational	Indicative compendium, operational lists	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	Only environmental protection products
- Operational	Indicative compendium, operational lists	Products listed in CEPA
- Categories	Characteristic and non-characteristic products	Mainly (characteristic) environmental protection services
Characteristics collected		
	Output, GVA, exports, employment	Output, costs of production: GFCF and net acquisition of non-produced assets for environmental protection; Imports and exports of EPS; net taxes on EPS; Final consumption of environmental protection products; Intermediate consumption of EPS by specialised producers; Transfers for environmental protection
	-	
	-	
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)
		Purchasers' price (final consumption, GFCF and exports)
		Extra costs (adapted and connected products)
Classifications		
	NACE; CReMA and CEPA	Institutional sectors, NACE (for ancillary activities); CEPA
Mandatory breakdowns	NACE (A*21), CEPA (7 groupings); CReMA (8 groupings)	NACE (only ancillary activities of 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	(Characteristic) environmental protection services: market inc. for own final use, non market, ancillary
Voluntary	Market specific products / output	Adapted and connected products (Households' final consumption)
	Market cleaner and resource efficient products / output	End of pipe investments; investments in integrated technologies (ancillary activities only)
	Non-market output	
	Ancillary output	
	Output for own final use	

The main common features of EGSS and EPEA are as follows: both are underpinned by the SEEA-CF accounting system, they use the same definitions for characteristics covered in both (e.g. output, employment), they measure supply and demand for identical categories of production (primary, secondary, ancillary) and of output (market, non-market, own-final use), they use the same valuation rules and rely on the same classifications.

For compilation, EGSS and EPEA use many common data sources: national accounts, Public Finance Statistics, SBS, PRODCOM, external trade, balance of payments, etc. This means that the adjustments the sources would need for EGSS and EPEA (e.g. turnover to output) would be the same. Moreover, EGSS estimates can feed into compilation of EPEA, and, on the other hand, EPEA data might be used for calculation of EGSS.

The main differences concern the scope of the accounts in terms of activities covered, and valuation principles. EGSS seeks information on both environmental protection and resource management activities whereas the scope of EPEA is limited to environmental protection services. EGSS covers

⁽⁸¹⁾ 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. For instance, the mandatory part of EGSS only covers market output

characteristic and non-characteristic activities, whereas EPEA focuses solely on characteristic activities. As regards valuation, EGSS measure the output of adapted products at their total value (at basic prices), EPEA considers only the extra cost of these products in relation to standard products (on a voluntary basis, limited to households' final consumption).

Besides these conceptual differences, the categories of products and CEPA (and NACE) groupings chosen for the reporting of EGSS and EPEA data to Eurostat are different. This is important for compilation purposes.

Some of the differences are now analysed in more detail.

CHARACTERISTIC AND NON-CHARACTERISTIC ACTIVITIES AND PRODUCTS⁽⁸²⁾

The concepts of characteristic and non-characteristic activities were introduced in the discussion of the working group Environmental Expenditure Statistics as part of an effort to unify terminology across EGSS and EPEA in the context of the integrated framework.

Environmental activities that serve directly an environmental purpose are called **characteristic environmental activities**. Activities that produce specifically designed products whose use serves an environmental purpose, although they are not characteristic, are called **non-characteristic environmental activities**. Non-characteristic activities are also important to properly measure the size of the environmental economy. The table below illustrates some examples of characteristic and non-characteristic activities.

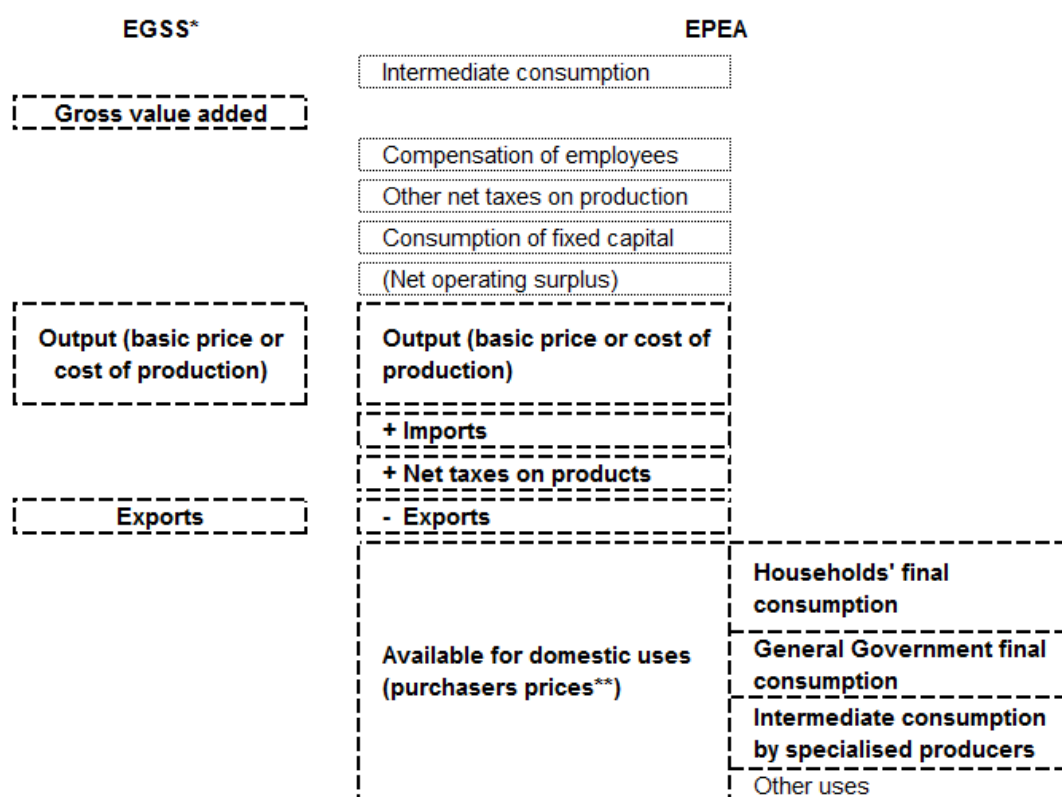
Table AN9-2 Examples of characteristic and non-characteristic activities

	Characteristic environmental activities	Non-characteristic environmental activities
Environmental protection	Provision of sewerage services, of collection, treatment and disposal of waste services; provision of remediation and clean up services for soil, groundwater and air; monitoring and reduction of exhaust gas pollutants	Manufacture of instruments, apparatus for analysis of pollutants, of septic tanks, of incinerators and machinery for waste treatment, of sound insulation materials, exhaust pipes etc.
Resource management	Provision of materials recovery services; production of gas, fuels, heat and electricity from renewable sources; thermal insulation works	Manufacture of solar panels, photovoltaic cells and wind turbines, of thermal insulation materials, of most resource efficient appliances

The scope of EGSS and EPEA differs in respect of the type of activities covered. EGSS encompasses both characteristic and non-characteristic products and activities, whereas EPEA only covers characteristic products and activities. The figure below presents the coverage of characteristic products.

⁽⁸²⁾ See also Eurostat 2015: Integrating the monetary environmental accounts, ENV/EXP/WG/01(2015), Working Group Environmental Expenditure Statistics

Figure AN9-1: Characteristic environmental protection products in EGSS and EPEA



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

** or extra cost (secondary purpose products)

INTERMEDIATE CONSUMPTION

Data on intermediate consumption is not reported to Eurostat in the EGSS accounts. However it is implicit as it is the difference between output and gross value added, both of which are reported. This 'implicit intermediate consumption' is the intermediate consumption by production units engaged in the EGSS.

The corresponding characteristic in EPEA is P2 (intermediate consumption for the production of environmental protection services), consisting of the sum of P2_EPS (intermediate consumption of environmental protection services for the production of environmental protection services) and P2_NEPS (intermediate consumption -excluding environmental protection services- for the production of environmental protection services). These are voluntary characteristics. The 'implicit intermediate consumption' from EGSS and P2 from EPEA are the same, except that EGSS covers EP and RM whereas EPEA covers only EP (however EGSS distinguishes EP and RM).

GROSS FIXED CAPITAL FORMATION

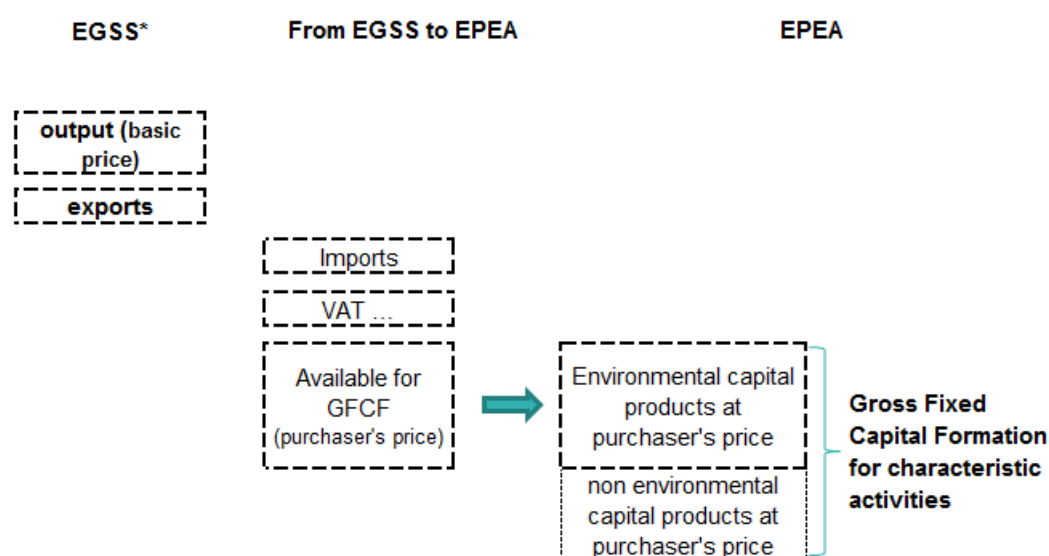
Whereas EGSS and EPEA have the same definition of GFCF, they apply it to different transactions.

EPEA reports the total expenditure of the domestic economy on GFCF (and net acquisitions of non-produced assets) undertaken for the purpose of the production of environmental protection services, irrespective of whether the fixed assets produced or acquired/disposed are environmental protection products (incinerators, apparatus for the analysis or measurement of pollutants, etc.) or not (cars, computers, administrative building, etc.).

EGSS reports solely the production value of fixed assets classified as environmental products, when they are constructed by domestic producers and at basic prices. It does not cover the non-environmental products that enter the GFCF for the production of environmental protection services. Furthermore EGSS report output and exports whereas EPEA reports domestic uses.

Figure AN9-2 depicts the relation between output of fixed environmental assets covered in EGSS and EPEA's expenditure on gross fixed capital formation for the purpose of production of environmental protection services, and adjustments needed to reconcile the two concepts.

Figure AN9-2: Output of fixed assets in EGSS and GFCF in environmental expenditure accounts



* non-characteristic environmental protection products mainly used for GFCF

VALUATION DIFFERENCES

Both EGSS and EPEA generally follow the national accounts valuation rules.⁽⁸³⁾ Output is valued at basic prices and expenditure (final consumption, intermediate consumption, GFCF) is valued at purchasers' prices.

If we wanted an integrated system that can reconcile or balance supply and demand (of environmental products, or by environmental producers), we would need to value supply and use in identical way. This can be done adjusting the valuation of supply to purchasers' prices, i.e., by summing to the supply at basic prices the elements needed to turn it into purchasers' prices, namely: transport costs, trade margins and taxes less subsidies on products.

This would require first a set of calculations of transport costs and trade margins, possibly with detail by environmental product. This is rather demanding, albeit the task is made simpler because EPEA do not have transport costs, and environmental protection services play a major role in EPEA.

The other valuation adjustment element is the taxes less subsidies on products. It is understood they are the taxes less subsidies on products in the EGSS/EPEA scope, i.e. environmental products. One would hope that the monetary modules on environmental taxes and subsidies fit in here.

⁽⁸³⁾ Exceptionally, EGSS uses a valuation rule for exports different from national accounts (basic prices instead of free on board). This is not very important for the discussion in this annex. For details see section 1.2.1.3.1.2.

Unfortunately, the definitions of environmental taxes and subsidies in those modules are different. For instance, the module on environmental taxes defines an environmental tax as a tax whose tax base is a physical unit (or a proxy of it) of something that has a proven, specific negative impact on the environment (and which is defined in the ESA 2010 as a tax). Instead, what we would need here to reconcile the valuation at basic prices and purchasers' prices would rather be a tax whose base is a product in the domain of the EGSS sector. The tax bases considered are different, although the definitions of 'taxes' and 'taxes on products' are the same. Therefore, valuing output and exports from EGSS at purchasers' prices (for balancing with uses from EPEA) would unfortunately require a special set of calculations of environmental taxes and subsidies on environmental products, different from those used in the modules on taxes and modules.

As an exception to the general rule expressed above that EGSS and EPEA follow the national accounts valuation rules, EPEA values adapted goods at extra cost, not at full cost. In order to balance or reconcile with EGSS from the supply side, we would need an additional (or alternative) valuation of the full product costs, at purchasers' prices.

CONCEPTUAL DIFFERENCES: WRAP UP

All in all, some of the differences between EGSS and EPEA are justified by their respective purposes and national accounts definitions. The fact that they are both underpinned by the SEEA-CF accounting system ensures that the information collected in both is compatible and complementary.

Key differences though appear to be the scope (RM, non-characteristic products) and valuation of adapted products. Consequently, solely for products and activities are covered in EGSS and EPEA (characteristic, EP) it is possible to have a balance supply and demand, or to compare independent estimates from EGSS and EPEA for plausibility checks, or to present the information in a common supply-use framework or in terms of the sequence of accounts (the fact that RM is not covered in EPEA would be overcome by integrating ReMEA into this system).

It would be possible to enhance the integration of EPEA and EGSS if the scope of EPEA was extended to include all elements not covered but covered in EGSS, e.g. non-characteristic products and activities, full valuation of adapted goods, etc. (Including also ReMEA in such EGSS-EPEA system would add the RM elements). Also if there were calculations to transpose valuation of EGSS aggregates at purchasers' prices. This would however make the accounts bigger, require estimating more cells, more aggregates and it would come with additional costs. The ultimate question is whether the advantages of the integrated system would compensate for the extra costs. This point is resumed in the next section.

Integration of EGSS and EPEA in the estimation process

Besides the conceptual differences and links between EGSS and EPEA in concepts and scope addressed above, another question is the compilation process. Are the compilation approaches of EGSS and EPEA sufficiently close, i.e., sources used and their processing, to allow an integrated estimation system for both accounts? This idea is appealing but not straightforward as it must allow for different treatment of many aspects which are not identical in both accounts, either due to conceptual differences as explained above, or to different sources used for EGSS and EPEA and requiring different treatment.

Actually the following 3 options could be considered, corresponding to 3 levels of ambition:

1. One common estimation system encompassing EGSS and EPEA;
2. 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;
3. Independent estimation systems for EGSS and EPEA. Estimates for some overlapping elements would be cross-checked for quality assurance.

When considering the entire production process for EGSS and EPEA data, including data sources

and compilation methods and procedures, similarities but also differences can be noted. The situation certainly varies across countries. Nevertheless, overall the following conclusions can be drawn:

The main data sources of EGSS and EPEA are the same or similar: national accounts (supply and use tables, COFOG, etc.), SBS, PRODCOM, external trade statistics. However the estimation approach is 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 permits to determine the perimeter of the EGSS sector in terms of producers covered, from which data need to be sourced for a systematic compilation, typically NACE by NACE. Estimation of market and non-market producers may or may not be done in one go or separately (using a different procedure). 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, specialised 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.

Therefore, the two approaches to data compilation apparently differ. National accountants are confronted with a similar situation in the process of the estimation of GDP from the supply and demand side. It is known that national accounts produce independent estimates of GDP under two or three various approaches (supply, demand and income) and combine them to deliver a final GDP result of higher quality than the figures compiled under each approach on its own. GDP from the supply side is typically estimated by compiling data for groups of producers (NACE by NACE), following a systematic approach, possibly in a supply and use table, and supplemented with estimates of taxes on production. GDP from the demand side is typically done by institutional sector, compiling final consumption for government and households sectors and GFCF (mostly but not only for corporations). Demand and supply are then balanced in supply and use tables.

Another aspect to consider is the groupings of the classifications (CEPA, NACE), because the reporting requirements differ between EGSS and EPEA. A classification of transactions or units in one dataset might not be relevant for the other (as it is the case for the use of CReMA for EPEA or institutional sectors for EGSS). The joint estimation process for EGSS-EPEA is only feasible if undertaken on the data with proper granularity, at the most detailed level of the classifications (CEPA classes, NACE divisions).

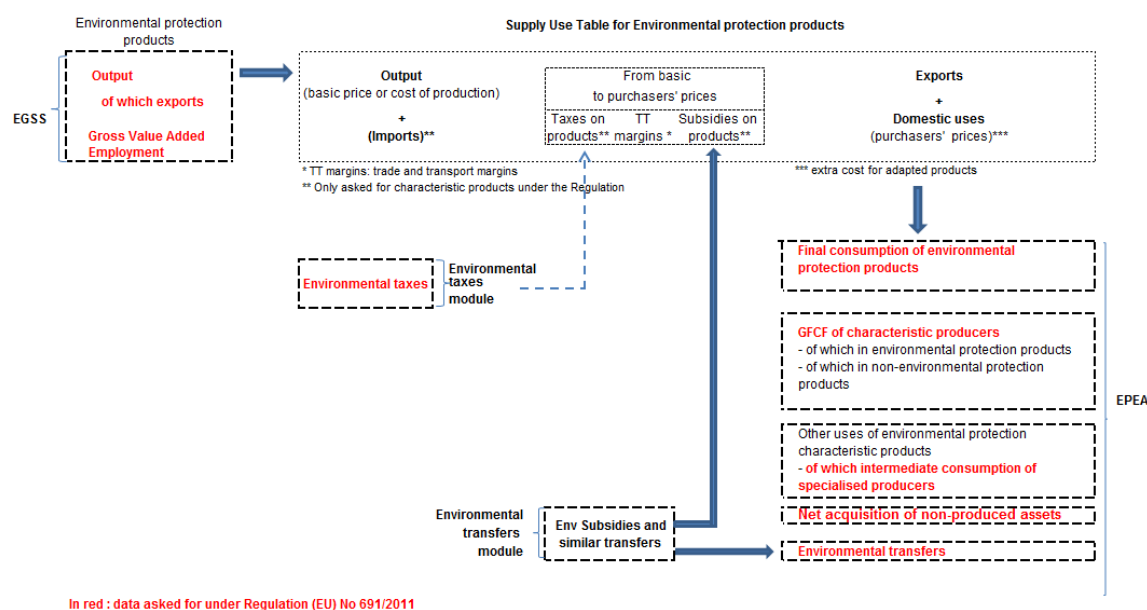
Option 1 (one integrated compilation system) would require an integration of a bigger scale, encompassing not only EGSS and EPEA but also ReMEA and environmental taxes and subsidies' production. For all the datasets, the estimates would have to be compiled at the same classification level (ideally NACE divisions and CEPA-CReMA classes), and would require 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 purchasers' prices, as seen above.

In ideal conditions, it would be possible that the estimation of EGSS and EPEA are parts of an integrated supply-use framework (most ambitious approach), in which, broadly speaking, the supply side would correspond to EGSS and the uses to EPEA. However it would also be possible to have one integrated estimation system for EGSS and EPEA with no need for a supply and use table. That approach would be less demanding but not enjoy full benefits, e.g. in terms of consistency checks.

It should be noted, however, that the above considerations might not properly reflect country-specific arrangements and in practice there may or may not be a wide gap between the estimation procedures for EGSS and EPEA. It is difficult to offer an overall assessment of the feasibility (and cost-savings) of a fully integrated estimation approach for EGSS and EPEA. Countries which have

not yet established procedures for compilation of the monetary environmental accounts might be in a better position to implement the integrated production system. So might be the countries which do streamline their processes. Where the existing processes are not integrated, but well established and very efficient, it might not be useful to revamp top-down the compilation of EGSS, EPEA and the other monetary environmental accounts to make them fit together. All in all, unless the national circumstances allow for it (e.g. a redesign of the system is foreseen anyway), there is presently a difficult case for option 1 (one common estimation system).

Figure AN9-3: Schematic representation of the integrated framework



Options 2 and 3 presented above focus on the overlapping elements between EGSS and EPEA. Supply-use balancing might be helpful for estimation of missing variables given that data on output, export and imports are available. For example, the EGSS account records output of environmental products that a part of the gross fixed capital formation for characteristic activities in the expenditure accounts. Some categories of output of environmental activities may also be calculated from the use estimates of EPEA (for specifics, refer to descriptions of a demand side approach to calculate output of environmental products using gross fixed capital formation data in the *EGSS Practical Guide, 2016 edition*). For streamlining the compilation, filling data-gaps and improving the estimates a transition (supply and use) table is needed to transform the valuation of output, exports, imports and domestic uses between basic and purchaser's price. For characteristic products this transformation is part of the EPEA account (EPEA questionnaire, Table 4). In principle, it is also possible to compile the same supply and use table for non-characteristic products, whose reporting is optional in the EPEA questionnaire Table 5 for households. However the benefits are less clear in this case.

Consequently, a certain level of integration of EGSS and EPEA compilation system is feasible to measure selected concepts traced in the accounts. But as important as feasibility, or more, is whether the integrated approach would offer efficiency gains, i.e., the costs savings (due to avoiding redundancies and double estimation of overlapping elements in EGSS and EPEA) exceed the cost of setting up common estimation procedures. If there are efficiency gains, option 2 (overlapping EGSS-EPEA elements to be estimated only once as inputs for both datasets) would be preferable. Otherwise, option 3 (overlapping EGSS-EPEA elements to be estimated separately, with cross-checks for quality assurances) would be the minimum recommended to take certain advantage of the common points across the EGSS and EPEA.

COMPILATION APPROACHES: WRAP UP

All in all, an integrated framework encompassing both EGSS and EPEA is possible but not

straightforward. At this stage of advancement in an integrated framework for the monetary accounts, priority is given 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 can there be a rebalance with the theoretical development so far. One first case of such country studies is documented in the Dutch report 'Testing the integration of environmental activity accounts for the Netherlands', which became available in April 2016. This report is published in the CIRCABC page for [country studies](#).

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Environmental goods and services sector accounts

HANDBOOK 2016 EDITION

The environmental goods and services sector, sometimes called 'eco-industries' or 'environmental industry', comprises all entities in their capacity as environmental producers, i.e., undertaking the economic activities that result in products for environmental protection and resource management. The environmental goods and services sector accounts is one of the European environmental-economic accounts and it is the ideal framework to collect data on value added and employment for the environmental sector. 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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