Economic aspects of the circular economy

Generic Framework and Process Description

Description of a generic conceptual framework for various sectors of the environmental economy: June 2023

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1 Introduction

1.1 Background and objective

Data supporting EU environmental policies have become increasingly important in the course of the EU Green Deal and related initiatives on the circular economy, climate change, and bioeconomy. Next to environmental issues, data needs also arise with regards to the economic aspects of businesses operating in environmentally relevant sectors. Since the establishment of the Environmental Goods and Services Sector (EGSS) accounts as part of Eurostat's environmental accounts, interest in an economic characterisation of various sectors of the economy relevant for environmental policy has further increased and diversified.

While the 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)[1], it does not lend itself well to the evolving nature of the environmental policy themes emerging, such as circular economy, bioeconomy, low carbon economy, blue economy, climate mitigation economy, climate change adaptation economy, and other. These evolving environmental policy themes have a focus that is particular to their theme and may not well or at all be represented by EGSS's classification of environmental protection activities and classification of resource management activities (e.g., climate change adaptation).

Many goods and services of the economy relevant for environmental policy do not have a distinct activity in standard statistical nomenclatures as is, for example, the case for the manufacture of machinery and equipment, or the manufacture of motor vehicles, and are not featured in the EGSS. They encompass activities classified under many different divisions and grouping of the NACE classification. Only a few NACE divisions are so closely related to these sectors that they may be considered as entirely being part of the circular economy, climate change mitigation, and/or climate change adaptation sector. Many of their activities cannot be easily identified from the NACE classification description.

A conducted literature review compared several existing approaches to assess green transition sectors (i.e., circular economy, climate change mitigation and climate change adaptation), as well as the bioeconomy sector. It considered the definitions applied, their scope, their delineation and methodological approach, the scoping procedures applied, as well as their practical application to obtain economic information/metrics[2]. The review also included a brief account and assessment

[1] 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 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.

[2] Within the considered literature body, the following key conclusions were drawn from the review:

- Only relatively few relevant and applicable studies could be identified.
- No internationally accepted sector definitions for either of the sectors exist.
- The scope of the CE, CCM, CCA and BE sectors vary between a narrow and broad spectrum and often do not correspond well with the definition or concept for that sector, due to lack of specification in the definition.
- Several studies for each sector are in part complementary, in terms of overall definition, scope, activities covered, and measurement approach, but no single normative /accepted way forward emerged.

of the approach developed under the EU Taxonomy of Sustainable Economic Activities[3]. Despite the growing demand for the economic characterisation of environmentally relevant sectors only few studies are internationally available. None, if not EGSS, provide a generic conceptual framework that can serve as reference for compilers of economic data on activities relevant for environmental policies and on various sectors of an environmental economy.

Against this background, an approach was developed under the project ESTAT/E/2019/009 commissioned by Eurostat, to

- delineate economic activities related to the three green transition sectors (CE, CCM, CCA) and the BE sector within the classification systems of NACE and Prodcom
- and analyse several economic variables based on existing data.

The methodological approach uses top-down modelling techniques, building on a cascade of indirect information was drawn upon by making use of a combination of already existing information. It is consistent with the general approach developed for the other statistical domains (such as EGSS), although with several differences and variations in the estimation procedures, not least due to the different activities being covered, available data, and resources available.

The **"Generic Framework Document"** at hand is part of several documents produced under the project. It describes the basic approach pursued to define the sectors, identify activities, and analyse data. It is "generic" in the sense that it may be applied also to assess the sectors using different data sources (e.g. national or regional data) or be applied to assess other economic sectors. The target audience for this document are users interested in the principal approach developed to assess green transition sectors, including compilers of official statistics (principally Eurostat and the statistical officers of the EU Member States), as well as policymakers and researchers. Further technical detail on the data analysis conducted under the project for all EU Member States based on Eurostat data can be found in the **related "Data Note"**. It entails information such as a description of the main data sources and the economic variables, the classifications used for breakdowns, and the different estimation methods which have been applied.

1.2 Structure of the document

Towards this aim, this document builds upon the common approach applied to the specific frameworks and experiences from their development (circular economy, climate change mitigation, climate change adaptation, and bioeconomy) to define a process for the delineation of a sector of the economy relevant from the perspective of environmental policy makers, and for the collection and compilation of data for the sector, based to the extent possible on publicly available statistical data. In this document, "sector" or "green transition sector" correspondingly refers to a sector of the economy relevant from the perspective of environmental policy, as opposed to an industrial sector. The generic conceptual framework, as the specific frameworks, are conceived to the extent

- Rather three different principal approaches were identified (top-down identification by classification code, bottom-up identification using surveys and micro-data, combination of the two including secondary statistics as proxy estimators).
- The choice of approach is largely dependent upon available resources, data availability (including considerations of confidentiality clauses, geographical scope, level of detail and desired metrics), and desired sectoral scope.

Practical application to a wider scope yields more complex scoping procedures and methodological estimation challenges.

[3] It was noted that the taxonomy's purpose differs. It is focused on screening criteria for financing performance enhancements i.e. substantial contribution across the economy (own performance and enabling other activities) and the maturity of the definitions to specify activities varies whereby circular economy is the least developed (at the point of writing).

possible as a satellite account to National Accounts, requiring definitions, classifications, and accounting rules.

The document is structured along the required stages of the process for a sector delineation:

- Chapter 2. Deriving a definition and scope of a sector

In this chapter, the process for defining and scoping of the sector is presented. Arguably this is an essential step, as not always a common internationally accepted definition is available. Furthermore, different interpretations of the scope can influence how broad a sector is to be conceptualised, which in turn influences the subsequent steps. The resulting list of economic activities of the sector for the environmental policy theme may be varyingly extensive. Currently, in many cases no international definitions exists or when available are ambiguous in their scope. An (inter)national definition may also not apply itself well to statistical data, so that a definition may need to be adjusted towards this aim.

- Chapter 3. Delineation of economic activities of the sector within existing economic classification systems and data compilation

Then, a process for delineation of the economic activities of the sector for the environmental policy theme is described. Identified economic activities need to be mapped against the economic classifications, as in most cases, the goods and services of the sector for the environmental policy theme do not have a distinct activity in standard statistical nomenclatures. They encompass activities classified under many different divisions and groupings of the economic classification. Only a few classification divisions are so closely related to these activities that they may be considered as entirely being part of the sector for the environmental policy theme. Many of their activities cannot be easily identified from the NACE classification description. A delineation methodology is needed to ensure that from the relevant aggregates from existing statistical sources, to which the good or services of the sector for the environmental policy theme is mapped, are not part of the economic sector data. This delineation methodology is described by the process of compilation of economic data, which relies on additional data sources.

- Chapter 4. Conclusions

To conclude, information to interpret the results is presented. Furthermore, the establishment of varying sectors for the various environmental policy themes may cause overlaps and interlinkages. While these are rooted in the overlapping subjects of the sectors, inconsistencies resulting from different definitions and scopes should be avoided.

2 Defining and scoping a green transition economic sector

2.1 Definitions

Before a green transition sector can be delineated, clarity on the definition and scope needs to be established. This building block is essential to continuously re-examine economic activities for their

inclusion against their suitability under the definition and scope. For climate change, such internationally recognised concepts and definitions are for instance provided by the IPCC (International Panel on Climate Change) and the UNFCCC (United Nations Framework Convention on Climate Change).

The kind of economic activity: goods and service to be covered

The sectors' goods and services need to be understood as a sub-set of the whole economy. The sector's producers are engaged in sectoral activities. The outputs of those activities are sectoral products. Whereas sectoral producers, activities, and products are quite closely related concepts, there is no perfect 1:1 relation between them as sectoral producers may also be engaged in non-sectoral activities (as secondary activities), and sectoral activities may also produce non-sectoral products.

To identify sectoral activities involves a degree of subjectivity, as economic activities may be undertaken for a variety of purposes, may change over time and across countries. A useful approach consists in focusing on the purpose of an economic activity or product produced because of that activity. The kind of economic activity to be covered then requires a definition of purpose(s). A purpose can be identified by its leading motivation or objective of actors, purpose laid down in legislation, or revealed intentions. In practice, these may be difficult to observe or measure, especially as activities are included as a secondary purpose. Therefore, they may be identified by their technical nature, presumed effect, and real effect.

Guidance can be drawn from the definition provided in the EGSS: "primary purpose is to reduce or eliminate pressures on the environment or to make more efficient use of natural resources". In the case of the EGSS, the primary purpose is defined as for environmental protection and resource management (classification of environmental protection activities (CEPA) and resource management activities (CReMA)), which in turn forms the basis of the Environmental Goods and Services Sector (EGSS). The purposes of the goods and services should then follow a purpose, which can be organised as categories or a classification, compatible with the definition. Such classifications of purpose should ideally already exist, be well established, and be intuitive.

The identification of relevant products (goods and services) is based on the defined sector's purpose. Relevant products are the outputs of economic activities that directly serve the sector's purposes or are specifically designed products whose use these serve. Economic activities of the sector can be performed as principal, secondary or ancillary activities or a producer. The specifications of such activities, the definition of terminology, and the scoping and delineation criteria are detailed in the EGSS Handbook (2016) chapter on Definitions, delimitations, and classifications.

From a statistical point of view, the focus on the technical aspects provides a neutral basis for determining the purpose. It allows considering the suitability of activities from a technical perspective of various goods and services for achieving the purpose irrespective of the agent's motivation for its production. A presumed technical effect of the product supports the delineation of the activities, as in most cases details on a product's entire life cycle are unavailable or insufficient.

The scope

In addition to the purpose of economic activities to be covered, the scope of the definition is important to delineate. The categories of purpose delineate the scope; however, additional boundaries may be desired. For example, passenger rail transport is widely considered as an environmentally sustainable mode of transport and, thus, an activity for climate protection, yet it is not included

in the indicative list of activities of the EGSS. The EGSS's scope is focused on state-of-the-art, and not just delimited by its purpose.

Even when internationally recognized bodies provide a definition, ambiguities may remain with regards to the boundaries of the scope that apply. For example, climate change mitigation may or may not include nuclear energy. The respective policy context may be a decisive factor for the scope. Under climate change mitigation, mass public transport can be included in a scope that includes impact i.e. lower GHG emissions than individual fossil fuel transport or similar. For measurability, the scope may also need to reflect the economic statistical nature of the delineation. For example, the scope for climate change adaptation distinguishes between different types of natural hazards that are likely to be increased in their likelihood and/or magnitude by actual or expected climatic stimuli from climate change. In this manner the fuzzy boundary between an existing natural hazard linked to climate and the attribution to climate change can be overcome. Despite increasing evidence that the intensity or likelihood of specific events can be linked to climate change, it is currently not possible to distinguish between "anyway ongoing" activities to avoid or moderate harm from climate related natural hazards and those specifically in response to expected climate stimuli caused by climate change. Thus, based on the assumption that climate change related adaptation needs are the main reason for current and future activities to moderate harm from expected natural hazards of the types identified above, all related preventative activities can be considered.

Definitions can be applied stricter, which narrows the scope to core activities that can be directly and unambiguously ascribed to a sector. A narrower scope allows limiting the sector to key activities, resulting in less resource intensive delimitation procedures and greater accuracy on what is being measured. However, it may not be true to the definition and objective set out by the sector or environmental policy theme, as relevant activities, which may be sizable, are neglected. A broader approach may lead to the inclusion of activities that are less clear to identify or activities far up- or downstream in a value chain.

The selected scope needs to correspond with the objectives as well as the definition set out and be relevant to policy makers. Defining the scope in a sufficiently accurate way for statistical measurement is, correspondingly, not straightforward and is confronted with questions of where to draw the boundary of the sector, and how to do it in a way that is conceptually relevant, statistically sound, and aligned in practice to available data sources for its compilation. There is no binary choice between narrow or broad, but rather a continuous line. For this reason, the scope should be defined initially broad, which can be continuously re-examined against the purpose(s) of the activities and other considerations, which leads to a more pronounced formulation of the scope. A clear and transparent documentation allows then identifying differences between delineations among the same sector and across sectors.

Borderline cases

Upstream activities (i.e. goods or services used as an input in the production of a sector product) and downstream activities (i.e. the production of a good or service that uses a product as an input in further production activities) are included when they meet the set-out scope and they either directly serve a sectoral purpose or produce specifically designed products whose use serve a sector purpose. It is the technical nature of the good or service produced in the upstream or downstream activity that determines whether this activity is considered a sector activity or not. This is the case for system components of sector goods if they are designed specifically and produced for a sector purpose.

A helpful approach for the identification is to conceptualise components as an enabling product (i.e. specialised components or products needed by an economic activity to realize its purpose) and certain services as transmitters (i.e. services needed for a sectoral economic activity to manifest its technical potential, such as installation or infrastructure construction services). For example, the technological enablers of an activity, such as the manufacturers of locomotives for the mass transport of people and goods. While this case may appear clear, other cases such as the manufacturers of metal waste shredders and cutters for the recycling industry may appear less intuitive yet would belong equally to such a boundary definition that includes technology enablers in the Circular Economy sector. Furthermore, an array of products, which do not have a primary purpose in reducing environmental pressure, can also contribute significantly indirectly by, for example, offering conventional products and services in novel ways (e.g. sharing, renting, leasing) by making use of new business models (e.g. Circular Business Models). These among other can play a role as transmitters of sector goods and services.

Borderline cases may require specific examination. For example, while car sharing is a business model with the technical potential to reduce individual car ownership and related material use (i.e. the number of registered cars and car production), the car itself is not considered as a component with a primary circular economy purpose. Borderline cases are particularly fuzzy for Circular Business Models, as these provide conventional products in a new way, so that they hold the technical potential to reduce overall number of products, can be designed and used for an extended lifetime etc., which in turn reduces material use. Furthermore, additional screening criteria, such as considerations of do no significant harm to other environmental objectives or even social objectives, may apply.

The scope also needs to consider possible overlaps between sectors (see Chapter 4) (e.g. Circular Economy overlapping with Climate Change Mitigation or Bioeconomy). On the one hand, the sector's scope should reflect the sector sufficiently clear without depending upon other sectors i.e. be relevant by itself. On the other hand, the scope should allow to identify overlaps between sectors and, thereby, comparisons between sectors. For reasonable comparability, the principal approach should be applied across sectors. This requires the scoping procedure drawing up a scope in such a way that overlaps can be identified i.e. list of products and their activities.

Summary

- Overall definition: A suitable and widely accepted overall definition of the environmental policy subject based on an international body serves as a starting point. The definition needs to be further specified to refer to related economic activities.
- Defining the boundaries of the scope: A broader scope is recommended to include not only core activities, but also their enabling technologies and other related activities aligned with the definition of the respective environmental sector and the scope.
- Sector classification by purpose: Criteria for the delineation of related economic activities can be established by means of a sector classification by purposes.

Following the establishment of what kind of economic activities are to be identified and delineated within the economic classification system and data frameworks, a list of sector goods and services can be developed.

2.2 Identification of sector activities: long list of activities

Drawing up a long list of activities of the sector

Building upon the definitions, a "long list" of activities of the sector can be developed. To this end, existing technological classifications, lists of goods and services from relevant studies, and other sources, such as market reports need to be reviewed. While in this step, all relevant activities should be listed as comprehensively as possible, irrespective of their representation by existing economic classifications, it is useful to begin by scanning and identifying relevant products and services within the nationally applicable most detailed NACE classification. The respective national classification systems are typically at least one level more detailed than the common European NACE and Prodcom classification. Applicable and relevant products, for example, can often already be identified within the existing national equivalent product classification system, which is more frequently updated to account of new products (e.g. in recent years biodiesel, e-vehicles, solar cells and modules) have been added to the German goods production classification.

By the very nature of such an approach, sources and the list's compositions will differ, especially over time as available information expands and new technologies emerge, or structuring frameworks evolve. The inclusion of experts and consideration of national characteristics of the geographic focus of the study in determining a list may introduce additional differences across countries in the selection of goods and activities to be included in a list. Approaches, therefore, may differ by which and how many sources are consulted to derive an indicative list of goods and services.

A specific framework will likely need a specifically designed list that matches the set-out criteria and is sufficiently flexible to allow for continuous adjustments, as new goods and services emerge or existing ones are superseded. Yet, available thematically related work can assist in deriving a sector specific long list and in providing consistency in the goods and services covered (e.g. the Sustainable Finance Taxonomy).. Such lists in combination with the data compilation may provide a powerful resource for identifying activities to be included in economic classification system updates, as for example the inclusion of e-vehicles in some countries' more detailed NACE classification and assist in identifying overlaps across frameworks.

The long list is then continuously narrowed down as activities are re-examined against the definition and scope, as well as practical constraint considerations, which in turn refine the definition and scope.

Matching list of goods and activities to economic classification/businesses

Once a list of relevant goods and services has been sourced, it needs to be matched against the economic classification system by drawing upon the NACE, more detailed CPA, and Prodcom classification. The description of the respective classification codes can be drawn upon for a more detailed understanding of the kind of goods or services covered by that particular code as stipulated by the classification system. In practice, the activities may cover principal, secondary or ancillary activities, but when matched against the economic classification this needs to be focused on the principal activities upon which the producer is accounted as in the statistical classification system. Insufficient information is available on the secondary activity occurring in the statistical classification. However, in instances it may be necessary to assume these if a specific sector production activity cannot be otherwise well matched against the principal activity. National accounts do not record separately the ancillary output (ESA 2010, § 1.31).

In cases, activities can be linked to individual businesses and by drawing upon, for example, business registers, that categorise businesses by principal and secondary activities, an indication of applicable economic classes can be derived. Often this requires additional resources, business registers' details may vary and may not provide the sufficient detail and consistency necessary for matching, especially at the international level.

Matching the list against statistical codes in the economic classification ensures to avoid double counting. At the European Statistical System level, all business statistics use harmonised classifications, thus facilitating international comparability of national figures.

However, the matching may be difficult as the list to be matched may not be readily identified in the classification classes. A degree of ambiguity may occur. Activities may not be well matched to or readily identified in the statistical classification system. Others may need to be excluded for being too diffuse and difficult to isolate.

Summary

- Drawing upon existing lists of goods and services, if available at the appropriate level, is recommended. In many cases such a list does not exist and needs to be transparently constructed.
- The developed long list of sector activities needs to be matched against the integrated system of economic classification. This prevents double counting, enables clear transparent allocations and reproducibility. Complementary, a micro-data approach may be used to assist in this process.
- The long list and the matching against the integrated system of economic classification should be clearly and transparently documented to allow for comparisons between studies of the same sector and with other sectors.

The final long list needs to contend with three dimensions: reflect the principles of the boundaries of the scope; reflect the definition set out by the environmental sector; and reflect what is actually identifiable within the integrated system of economic classification. These dimensions may corset each other. A broader scope may be truer to the definition but may infringe on existing boundaries and increase identification complexity. A narrower scope may undermine the definition while being easier to delineate.

The long list matched against the integrated system of economic classification forms the basis of a top-down modelling technique for the sector's data compilation. A key element is the development of a share-based statistical model by deriving relevant proportions (or shares) to delimit relevant from non-relevant products and their activities within the economic classes of the integrated system of economic classification by using publicly available data, especially official secondary statistics.

3 Delineation and data compilation

3.1 Principle approach and key concepts

The approach how economic sector activities were identified and mapped to applicable NACE has been described above and builds upon this operationalised scope of each sector in form of the long list of activities mapped to the NACE and Prodcom classification. In only few cases the full NACE class will represent the specific sector activity. The mapped NACE codes often do not correspond exactly with the specific sector activities considered relevant for the environmental purpose. Thus, the compilation of economic data relies on additional information. As the scope becomes broader the number of cases for which this applies increases.

Two principal approaches exist, a bottom-up approach, using micro-level data, or a top-down approach, using meso-macro level aggregate data, to delimit the non-applicable part of the economic class from the applicable. While for EGSS specific surveys have also been established, this methodological approach is assumed as not available as a principal approach, although can be used in liaison and complementary for refinement, cross-referencing, and validation. In most cases, surveys have a large administrative burden, high time requirement and costs, while also embodying uncertainty on the ability to deliver good quality results.

In contrast, a top-down approach draws upon existing publicly available data making use of modelling techniques, “as it generally needs to identify the environmental share of broader activity of 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)” (EGSS).

The top-down approach aims to determine the part of a product, activity, or employment aggregate that is related to the production of the sector’s product through a suitable combination of existing statistics. This approach provides to policy makers a sound quantitative orientation on the sector for environmental policy without a large burden for data compilers. It typically provides a sufficiently robust quantitative orientation for policy needs.

Following, a methodological top-down approach is described, which draws upon macro-level data (i.e., aggregated data for groups of producers or for groups of products) from existing statistical data sources. The data compilation method builds upon the established approach and is at its core consistent with the top-down approach described by EGSS, although with several differences and variations in the estimation procedures, not least due to the different activities being covered, available data, and resources available. This chapter, therefore, draws upon the work and definitions provided by the EGSS Handbook: Practical Guide.

The top-down approach builds on main data sources for the selected variables that characterise the economic sector. Aggregated data representing totals for economic activities, sectors, products, or product groups are primarily provided by National Accounts, Structural Business Statistics, and Prodcom. These can be respectively considered from the supply side (e.g. SBS, Prodcom) and from the demand side (e.g. Use Tables).

Other sector specific statistics, for example for energy and agriculture, provide additional data, as the top-down approach aims to determine the part of a product, activity, or employment aggregate that is related to the production of the sector's products. Their suitable combination of relevant, existing statistics (i.e. secondary statistics) are described in Chapter 3.2 on the estimation procedure.

Main variables

As a sub-sector of the whole economy, the sector account requires defining the variables in the same way as in national accounts and valued according to the principles of the national accounts. However, as the principal data source for the variables is provided by SBS, as it is more detailed than the National Accounts (NA), conceptual differences exist, which can be adjusted at a later stage to be more consistent with the National Accounts.

Output

According to National Accounts, market output consists of output that is disposed of on the market or intended to be disposed of in the market (ESA 2010, § 3.17).

- It includes products sold at economically significant prices, products bartered, products used for payments in kind, products supplied by one LKAU4 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);
- It is valued at basic prices which are the prices received from the purchasers plus subsidies on products minus taxes on products, 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).

Other forms of output include the non-market output (provided to other units for free), for own final use, and ancillary output (for use within an enterprise), which are not considered, as for these limited data is available.

The principal sources for Output are taken from the production value of SBS and sold production volume from Prodcom, as the most detailed applicable market output.

Not all economic activities are covered by SBS, in which case from the National Accounts Use table, Output (P1) can be used.

Exports / Imports

Exports of goods and services consist of transaction in products (sales, barter, and gifts) from residents to non-residents. Exports/Imports should be valued at basic prices as exports/imports should be considered from the supply side (i.e. the part of output which is exported).

The statistical value is the amount that would be invoiced in the event of sale or purchase at the national border of the reporting country. It is said to be a FOB (Free On Board) valuation for exports and a CIF (Cost Insurance Freight) valuation for imports. Hence, only incidental expenses (freight, insurance) are included and incurred for:

[4] Local Kind of Activity Unit.

- exports in the part of the journey located on the territory of the country where the goods are exported from;
- imports in the part of the journey located outside the territory of the country where the goods are imported to.

Exports and imports are taken from Prodcom, which is based on the Comext statistics on the international trade in goods. Only manufactured goods are included.

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), typically valued at basic prices. SBS refers to Value Added, which is taken as synonymous for Gross Value Added given no further specification on the definition differences by the SBS methodology.

In the compilation practice the applicable needs to be distinguished from the non-applicable part. When the ratios of GVA to output are derived from national accounts data to calculate the sector gross value added from the sector output, this is done implicitly.

Not all economic activities are covered by SBS, in which case from the National Accounts Use table, Gross Value Added (B1G) can be used.

Employment

The definition of employment is the same as in national accounts (ESA 2010, § 11.11). Employment in EGSS market activities consists of all persons engaged in productive sector market activities that fall within the production boundary of the national accounts. The same definition is applied for the sectors. Persons in employment are employees or self-employed persons according to the definitions and categories listed in ESA 2010 §§ 11.13-1114 and 11.115-11.16.

Only the part relating to the sector products is to count towards the sector's employment.

In the compilation practice the restriction to that part relating to the environmental products will often be made implicitly, for example, when employment is derived from output ratios from national accounts i.e. ratios are applied to calculate sector employment from sector output.

The equivalent in SBS is number of persons employed. Not all economic activities are covered by SBS, in which case from the National Accounts total employment domestic concept can be used.

Sector 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). Data measured in FTE may not be readily available in the basic sources for the sector's 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, as proposed by EGSS.

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.

Investment

Gross fixed capital formation (GFCF) is not reported by SBS. SBS reports investments in tangible goods. There are significant conceptual differences. Gross fixed capital formation consists of resident producers' acquisitions, less disposals, of fixed assets during a given period plus certain additions to the value of non-produced assets realised by the productive activity of producer or institutional units. Fixed assets are produced assets used in production for more than one year. It includes investments in intangible goods.

Not all economic activities are covered by SBS, in which case from the National Accounts, Gross capital formation by industry less the intangible assets (e.g. biological resources, intellectual property), can be used as an approximation.

In the compilation practice the applicable needs to be distinguished from the non-applicable part. When the ratios of cross capital formation to output are derived from national accounts data to calculate the sector cross capital formation from the sector output, this is done implicitly.

Classifications

Classifications are useful to break down the characteristics of the sectors accounts (output, exports, gross value added, employment, investment), 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 local kind-of-activity units (LKAUs) engaged on the same or similar kind-of-activity (ESA 2010, §§ 1.59, 2.150-2.152). The respective same statistical unit is applicable for the economic characterisation of the sector (output, gross value added, employment, exports).

CPA

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.

Prodcom

Prodcom is a product classification and plays a role in the compilation of sector accounts. 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). 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. The first six digits of the CPA supplemented by additional two digits. The detail provided by Prodcom can allow for the identification of sector output which is not singled out by CPA or NACE.

Main data sources

The main sources for deriving sector statistics can be roughly divided into two groups: supply side sources and demand side sources. Standard supply side sources comprise business registers, structural business statistics (SBS), statistics on the production in manufactured goods (Prodcom),

and the production and generation of income accounts and supply tables of the national accounts (NA). Demand side sources include the national accounts use tables.

National Accounts

National accounts (NA) are an important source for compiling sector statistics and should provide the definitions and valuation principles for the characteristics (e.g. output, gross value added, employment) for the sector accounts. National Accounts apply important conceptual adjustments to statistical source data to comply with ESA concepts. Normally they have been integrated into a supply-use-framework and balanced from a supply and use perspective to achieve a high level of consistency and exhaustiveness, which can be drawn upon.

For some areas such as organic farming and renewable energy national accounts data may be combined with sector specific statistics (e.g. agricultural and energy statistics), physical data, information from trade associations, business reports and engineering information to derive estimates for the sector producers within the relevant broader industries.

National Accounts represent a complete and consistent accounting techniques for measuring the economic activity of a nation. However, the economic data remains at a highly aggregated level, which is less suitable for characterising a sub-section of the whole economy, as is the case with the sectors for environmental policy themes. In the case of the NACE classification the detail provided by the SBS statistics, which in contrast to NA, is available up to the 4-digit level (in some countries even more detailed) is more suitable. Conceptual and data inconsistency with the National Accounts occur that require acknowledging.

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 SBS variables of interest for the compilation of sector market output is the production value. These variables are available at NACE class level (four digits). The SBS also collects data on the gross value added, number of employees, gross fixed capital formation, among other, which are drawn upon for the compilation of the sector accounts. There are, however, conceptual differences between SBS and national accounts (NA).

The reasons for these differences can be manifold:

- NA is used for macro-economic and national financial economic purposes, while SBS is focused on companies and concepts are more related to businesses accountability. One could say that they speak different languages whose convergence is not always straightforward. This is reflected for example in output valuation principles. Treatment of stocks, taxes and subsidies are two potential sources of differences. Those differences are quite specific of the individual products, so comparisons from NACE divisions in both may not be representative of the individual products included in the target sectors (CCM, CCA, etc). Other variables may have even larger divergences.
- SBS uses the enterprise as statistical unit, 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. 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 the part of non-market output from NA output figures can be deducted. 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.

The use of SBS for sector accounts requires adjustments to meet the definition and valuation principles for market output. SBS production value is assumed as a better approximation for market output than turnover. SBS as a result does not fully cover the sector market output as National Accounts do. SBS production value may thus require some adjustments requiring consideration to be conceptually closer to the market output definition of the national accounts.

Also, only for very few NACE divisions or classes apply almost entirely to the sector. In the following we examine the Prodcom-statistics as an additional source.

Prodcom

The main difference between SBS and Prodcom is that SBS relates to economic activities (e.g. the activity of the producers) whereas Prodcom relates 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.

Besides conceptual differences with the market output concept of sector accounts, Prodcom can have a limited coverage of units. The Prodcom Regulation does not require to survey enterprises with less than 20 employees. Using sold production as an approximation for sector market output can result in underestimation due to enterprises not being covered. As a conclusion, Prodcom can be used to estimate sector market output for product positions that are (almost) entirely sectoral goods (such as wind powered generating sets).

There can be other Prodcom positions that may require certain shares for a sectoral product estimation. To identify these shares the Prodcom statistics can be combined with supplementary information.

Summary

The discussion of the main variables and main data sources highlighted several conceptual and statistical inconsistencies, but also some important commonalities on the variables made available by the different data sources, which are linked by the integrated system of economic classification. These can be drawn upon for the top-down modelling to derive, combined with secondary statistics, and to apply shares for estimating the sector activities.

Where the industry and product breakdown are not sufficiently detailed to identify the sectoral activities and their products, the main data sources for the variables can be combined with secondary statistics (e.g. for agriculture and energy) for the estimation of shares. Sector specific statistics data may, however, be less precise than estimates based on micro-data. Estimates based on the top-down approach can be supplemented with information from trade associations and business reports to verify the shares of sector characteristics within the relevant broader industries.

The mapping of activities and matching against the economic classification system can occur in the NACE and product classification. In the case of the NACE classification this is most suitably conducted in the SBS statistics, which in contrast to NA is available up to the 4-digit level (in some countries even more detailed). Products can be matched against the Prodcom classification at 8-digit level (in some countries even more detailed). In few cases these classes will fully apply the sector's activity or product. Subsequently a share of these classes will need to be derived. Following, the shares can be applied to the matched class and computed upwards to the NACE classification level for which the respective variable's base value is available. For practical and consistency considerations this is conducted in the SBS data frame for later potential harmonisation with NA.

The following sub-chapter details the available estimation approaches.

3.2 Estimation procedure and data compilation

This chapter describes methods to compile the data on the sectors.

Methods to compile Output

Fully considered NACE codes

Fully considered NACE codes describe those activities that match fully to a NACE class, so that the data of these activities can be fully allocated to the sector. Output is based on SBS as an approximation for market output. No estimation is required.

Fully considered Prodcom

Fully considered Prodcom codes describe those goods that match fully to a Prodcom class, so that the sold production volume is used as approximation for market output of the respective sector activity.

Based on secondary statistics from Eurostat

In most cases, a sector's activity's output is not represented by a NACE or a product class. Aligned with a top-down approach, available secondary statistics are drawn upon as a proxy to estimate the sector activity's share in the class. Secondary statistics can provide useful proxy values to differentiate the existing market. For top-down modelling techniques deriving and applying dynamic year on year share estimates for EU member states requires the secondary statistics to be frequently updated, available for all or most EU member states, consistent across time and geography, and publicly accessible for automatic integration into the modelling tool. These criteria limit available data to those provided by Eurostat.

The approach assumes that the production of output of a class follows the same proportional structure as the proxy statistic. For example, the economic output of the electricity generation, transmission and distribution does not differentiate by renewable or non-renewable energy sources. The complete energy balance made available by Eurostat provides, however, detailed statistics on the gross electricity and heat production for the European countries. This assumption does not consider the different cost and price structures of the different energy sources, thus is only an approximation, but leads to better estimations than excluding or including the complete energy generation activities in the sector's output. With additional efforts, cost and price structures can be included in the modelling to account for these elements, albeit significantly increasing the modelling complexity as, for example, the renewable energy costs have seen a dynamic development in the last decades.

Available secondary statistics need to be carefully mapped and matched against the sector activities at either product or service level. Depending upon the geographic scope, available data may vary in detail and applicability. It is important that the secondary statistics brought into relationship with each other represent well the potentially very heterogenous NACE or product class. In cases, it may be advisable to move up a hierarchical level for a better match, or when a class is very heterogenous to find an alternative estimation approach or not include that sector activity at all.

Based on Use Tables

Supply tables describe how goods and services become available in an economy. Use tables show where and how goods and services are used in the economy. They can be used either in intermediate consumption or in final use, which in turn is divided into consumption, gross capital formation, and exports. This approach draws upon the monetary flows of the use table as a means of estimating the share of the selected sector activity in the corresponding NACE activities.

Based on the intermediate consumption relationship from the use table, it is assumed that the goods and services contained in the final uses are composed of the same supply-use structure. It is assumed that the supply use structure between producer and user reflect different goods and services according to the demands of the use-side. This assumption is used to derive the share of product and services of principal producers. The matching of sector activities against the economic classification, without other readily available secondary sources to derive a share for the sector from the non-sector activity, is extended by an assumption of the principal users.

Under this approach, the distribution of intermediate consumption in the use table is taken as a basis for the calculation of shares. The use table also provides data on final uses (including capital formation) but not their monetary flows between production activities. For this reason, it is necessary to assume that the flow to final uses has the same structure as the intermediate consumption inputs. This assumption allows to apply the derived shares of a production activity to all intermediate consumption to the total output/production value of that production activity.

However, as the use tables are only provided at an aggregate level (2-digit or higher) additional assumptions need to be applied.

Variant 1: Use amount used by services of sector recipient applied to derive share of producer

a) **Sector activity matched in NACE used by sector activity:** The production use amount between producer and user is proportionally distributed by the User with sector activity and reduced by the non-sector activity. For example, the production use amount between F and 37-39 is distributed to 37 and 38 proportionate to their amount in E37-39. The amount is weighted by the number of sector producers in F by the respective NACE value and number of occurrences. The amount is also weighted by the number of users, should a sector producer supply to more than one sector user (e.g. to E37 and E38). This assumes that the total amount supplied from F to E37-39 is reflected by the activities and NACE identified for these activities on the one side. On the other side, it is assumed that the total amount supplied from F to E37-39 is homogenously used by the activities within E37-39, and, thus, proportionate to the production value of the NACE activities below the aggregate E37-39. In this example, it is assumed that F also supplies to E39, which does not contain sector activities.

b) **Sector activity matched in Prodcom used by sector activity**: The share of the sector activity is derived as above, however, rather than applying the use production value to the producing sector activity in the NACE classes at 2-4 digit level, as described in a), the production value is assumed to be part of the production output of the product, as mapped in Prodcom. For example, the production use amount between C20 and E37-39 is distributed to 37 proportionate to their amount in E37-39. It is assumed that the sector activities mapped in C20 fully reflect the use of the proportionate amount of E37 in E37-39. The amount is weighted by the number of sector goods produced. The amount is also weighted by the number of users, should a good be assumed to be used by more than one sector user (e.g. to E37 and E38). On the one side, it is assumed that the total amount supplied from C20 to the proportionate amount of E37 in E37-39 is reflected by the products identified in C20 (in CE three were identified). On the other side, it is assumed that the total amount supplied from C20 to E37-39 is homogenously used by the activities within E37-39, i.e. E37 relative to E39. The resulting production value of the sector's good via Prodcom is assumed to be the same in the NACE classification in SBS. This implies that these sector's goods from the same producer user relationship have the same share in their Prodcom class although their respective values and thus share in the respective NACE class vary.

Variant 2: As variant 1 with combination of secondary data sources

In several instances, the monetary flows from one producer to a user is more heterogenous. For example, most goods provided by producers used by the energy generation sector could apply to not only selected renewable energies but also to non-renewable energy application. Few goods' areas of application or purposes are sufficiently detailed by the grouped good classes. Applying the assumptions as in Variant 1 would likely lead to an overestimation. Lacking other secondary data sources, the estimation approach detailed above is thus extended by drawing upon additional secondary data for an estimate on the sector share of the user. The underlying data may have already been obtained to derive the sector share of those users' output (see secondary data sources). For example, generating sets (excluding wind-powered and powered by spark-ignition internal combustion piston engine) are used by most other renewable energy sources except photovoltaic. Thus, the input from C27 to D35 is reduced by the share of non-renewable and a selection of renewable energy, which is derived from secondary statistics e.g. complete energy balance. An underlying strong assumption is not just the homogenous distribution of produce within D35, but also that the output value of the good is the same across all forms of electric power generation. Accuracy could be increased by accounting balance of cost structures for each technology, installation, and renewal rates. This was outside the scope of the current project.

Based on other secondary data sources

In practice the share of sector activities within a class cannot all be estimated by the approaches described above. For the remaining cases, additional sources can be explored including other secondary statistics, not available from Eurostat, available for a few countries or few years only, literature, proportionality assumptions, expert interviews, among other. For examples of the range of possible opportunities, please refer to the Data Note[5].

The intention, aligned with a top-down approach, is to minimize resource use by drawing upon existing research as much as possible. The robustness of the resulting estimates will vary significantly.

Methods to compile Export and Imports

Prodcom provides data on sold production, exports, and imports by product classification. Following the methods described for Output, exports and imports are derived based on the same share of the product class as for sold production.

Deriving the exports and imports based on the output derived share implies that the export structure reflects the total output structure. The export structure is geared towards demand from external markets and goods specialisation. External markets and internal markets can be different.

Similarly, the imports are assumed to reflect the total output structure of the internal market production, not accounting for trade specialisation of external markets i.e. goods may be demanded that are not sufficiently supplied (in terms of technological specialisation or price).

Exports and Imports only include goods, not services.

Methods to compile Value Added

The sector's gross valued added (GVA) uses the same framework as the models for the sector output and employment. Sector activity's GVA is estimated by using the same shares as derived

[5] A separate document provided under this project.

from output. It is equivalent to using the ratio of sector's activity output to class output applied to class value added when operated within the same data frame of SBS.

The basic assumption is that the average shares of gross value added to output in an industry are sufficiently good indicators of the environmentally relevant activities within that industry. Or rather, that the value added reflects the same structural assumption as output.

Not all economic activities are covered by SBS, in which case from the National Accounts Use table, Gross Value Added (B1G) can be used.

Methods to compile Employment

The sector accounts data on employment are directly linked with the production of the sector output. Employment is estimated by using the same shares as derived from output. Indirect employment due to the production of non-sector products should not be covered.

It requires mentioning that the smaller the share of the sector's goods and services in the total production of an industry, the bigger is the uncertainty about the representativeness of the industry's labour intensities for the sector. The representativeness may then depend on how similar the technologies used in the industry to produce sector and non-sector output are. The EGSS illustrate this with the following example: the labour intensity in the production of low air emission cars may be not much different from the one in the production of normal cars, whereas different technologies used in the production of electricity from renewable and non-renewable sources may result in different intensities.

For better international comparability, employment should be measured in full-time equivalent (FTE) rather than in number of persons employed. Employment data measured in FTE is not available from SBS and in NA are often missing or at a too high aggregate level, so that figures on the number of persons employed must be converted into FTE. Using the number of persons employed instead of FTE would probably result in some overestimation because of the existence of part-time workers. Not all economic activities are covered by SBS, in which case from the National Accounts total employment domestic concept can be used.

Following the approach specified by EGSS, the Labour Force Survey (LFS) data from Eurostat is used on the average number of usual weekly hours of work and average in full-time/part-time by economic activity to estimate the ratios between hours worked per employee in part-time and full-time jobs, which is then applied to the number of persons employed to derive employment FTE by economic activity. As the LFS data is at a high aggregate level, the same ratio of full-time to part-time employment must be assumed.

This approach can be complemented with additional information from country specific data sources and/or sectors if available. This increases, however, modelling complexity and data requirements.

Methods to compile Investment

Gross capital formation includes gross fixed capital formation, changes in inventories and acquisitions less disposal of valuables. Gross fixed capital formation reflects investments in tangible and intangible goods. SBS data on "investment in tangible goods" is more restrictive. However, given the more detailed data available at NACE 3-4 digit level provides a more accurate reflection of the sector's investment activities although shortened by intangible goods.

Not all economic activities are covered by SBS, in which case from the National Accounts, Gross capital formation by industry less the intangible assets (e.g. biological resources, intellectual property), can be used as an approximation.

Summary

Without expanding the official classification systems, alternative and complementary approaches are needed to extrapolate information on the sectors. Products and their activities belonging to the respective sector need to be identified beforehand to be matched with the economic classification system or with businesses in accordance with the scope's boundaries discussed above.

The scope of economic products and their activities and how these are included (fully or partially) is the single largest factor affecting the overall results. Individual economic activities can dominate the overall result (e.g. NACE 45.2 Maintenance and repair of motor vehicles or NACE 77 Rental and leasing activities, as in the case of Circular Economy). Partial inclusion can mitigate this by focusing on an estimated share. The kind of activities these embody require careful consideration against the scope and sustainability objectives. The estimation of shares introduces uncertainties and imprecisions, depending upon the estimation approach, available data, and resulting underlying assumptions. These can be assessed based on computing elasticities resulting from the applied share.

4 Conclusions

In the context of the data needs for EU policies on environmental sectors, it is necessary to improve information available on economic aspects, such as output and gross value added of businesses operating in the circular economy sector, jobs created, investment, etc. Currently national statistics agencies collect economic data on several sectors relevant for environmental policy only to a relatively limited extent. Monitoring the development of these environmental sectors is, however, paramount to inform the course of policy measures.

4.1 Interpreting the results

The approach described allows to derive comprehensive, detailed and reliable results based on available statistical data. They may, however, be less precise than estimates based on micro-data. Whenever possible, the estimates based on the top-down approach should be supplemented with information from trade associations, business reports and other sources to verify the shares of environmental characteristics within the relevant broader industries.

Results will be driven principally by several factors.

1. Firstly, a broader scope results in an overall greater environmental sector. A broader scope will in most cases be closer to the definition of the environmental sector. A too narrow or very broad scope may both limited the analytical usefulness of the environmental sector. Alignment with the definition of SEEA and the indicative list by EGSS may not apply to some cases or may stand in contradiction to other specific frameworks (e.g., maintenance and repair of motor vehicles) or are not covered (e.g. mass public transport).
2. Secondly and relatedly, a list of products and their activities can include or not include sizable economic activities.
3. Thirdly and relatedly, shares of economic classes or business activities need to be derived in most cases. Not accounting for a coefficient separating relevant from non-relevant will lead to an overestimation or forces the exclusion of relevant products and their activities leading to an underestimation.
4. Fourthly, databases and their available metrics need to be available across Member States to be comparable. So too should the secondary data for the estimation procedure for the share of the relevant activity from all activities of the class or business. Official European business and macro-economic statistics provide harmonised data to which shares can be applied. Using databases provided by non-official third, possibly private, parties to derive indicators may result in incompatibility with official sources e.g. share in the total economy and variation in coverage

4.2 Categorisation of existing frameworks: linkages and overlaps

In light of existing and emerging frameworks, overlaps and interlinkages need to be considered for greater coherence, on the one hand, and to avoid unnecessary duplication of processes and efforts, on the other hand. Eventually this may provide a basis for conceptualising an umbrella approach for environmentally relevant economic sectors. Overlaps and linkages should be explored both from

a conceptual perspective considering definitions and scopes as well as on the operational level by a comparison of the NACE codes used in the sector delineations. Table 1 provides an overview of general conceptual overlaps and interlinkages of the three sectors examined in this project (circular economy, climate change mitigation, and climate change adaptation) with each other as well as with the bioeconomy sector, EGSS, and the EU Taxonomy of sustainable economic activities[6]. With regards to NACE codes, a comparison has been conducted for the specific frameworks developed under this project. A multiple attribution of one NACE code may result from an actual overlap (multiple assignment of specific activities to various sectors) or from a situation in which different relevant activities are covered by the same NACE (to be reflected by different shares).

Table 1 Overview of overlaps between the sectors (CE, CCM, CCA, and Bioeconomy)

	Circular Economy	**Climate Change Mitigation**	**Climate Change Adaptation**
Climate Change Mitigation	- Agricultural activities with biofuels (energy crops) - Forestry activities with sinks by afforestation - Bio-material substitutes with use in energy efficiency products (e.g. insulation…) and biofuels (e.g. wood pellets) - Biowaste usage versus bioenergy - Remediation activities (e.g. reforestation) - Environmental protection (e.g. wetlands as sinks)		
Climate Change Adaptation	- Agricultural activities with agricultural ecosystem protection activities - Forestry activities with forestry services (fire prevention, ecosystem protection…) - Wood or cork products for insulation/insulation materials (substituting other materials) - Water desalination infrastructure (e.g. droughts) - Sewage system (e.g. rain capacities, construction, design) - Remediation activities (e.g. ecosystem protection) - Environmental protection (e.g. ecosystem protection)	- Agricultural activities with biofuels (energy crops) - Forestry activities with biofuels and sinks - Civil construction (e.g. renewable energy and flood resistant infrastructure i.e. grids and transport) - Residential builds (e.g. flood resistant and energy efficient)	
Bioeconomy	- Natural renewable resources (agriculture, forestry, fisheries) and products thereof - Use and treatment of biowastes - Remediation activities (e.g. ecosystem services) - Environmental protection (e.g. ecosystem services)	- Agricultural activities with bioenergy (e.g. energy crops) - Forestry activities with biofuels (e.g. wood collection) - Manufacturing of bioenergy (e.g. wood pellets) - Use of bioenergy for energy and heat generation and associated technological products (e.g. reactors, mills, digestors, boilers)	- Agricultural activities with agricultural ecosystem protection activities - Forestry activities with forestry services (fire prevention, ecosystem protection…) - Wood or cork products for insulation/insulation materials (substituting other materials) - Remediation activities (e.g. ecosystem protection) - Environmental protection (e.g. ecosystem protection)

[6] The Taxonomy has been considered in its current adopted state as of autumn 2021. Currently, a revision and enhancement of the Taxonomy is under way.

EU Taxonomy on Sustainable Finance	- Recycling of primary materials like plastics, iron, steel, and aluminium - Sewerage - Waste collection, treatment and materials recovery	- Climate friendly forestry and energy crop production - Production and distribution of renewable energy - Climate friendly building construction and renovation - Infrastructure for low carbon transport - Public freight and passenger transport (sea, rail and road)	- Climate resilient forestry and agriculture (environmental protection measures) - Water collection, treatment and supply - Sewerage - Climate resilient construction and renovation
EGSS	- Water treatment and sewage infrastructure - Recycling and Recovery of materials - Waste collection and treatment - Repair services - Remediation	- Renewable Energy production - Fuel wood and biofuels - Energy efficiency (e.g. insulation) - Sustainable transport	- Insulation and climate resilient buildings - Organic agriculture and sustainable farming - Water treatment and sewage infrastructure - Repair services for adaptation machinery - Environmental consulting