Chapter 4: Monetary flow accounts

Version for Global Consultation

Table of contents

4.1 Introduction

1. An important component of environmental and economic accounting is the recording of the environmentally related monetary transactions between economic units. Some of these transactions concern physical flows of natural resources and other natural inputs but many concern activity undertaken to preserve and protect the environment. As well, there are a range of transactions, such as taxes and subsidies, that reflect efforts by governments to influence behaviours of producers and consumers with respect to the environment.

2. All of these environmentally related transactions are recorded within the core national accounts framework but many cannot be easily identified due to the structure of the accounts or the types of classifications that are used. This chapter describes approaches that have been developed for recognising these transactions and provides appropriate definitions and accounts for the organisation of information on environmentally related transactions.

3. A strong motivation for undertaking this work is to identify an environmental component within the key aggregates of the SNA. Further, in combination with information on the changing state of the environment, information on these monetary transactions may be used to assess whether money spent on improving the environment is being used effectively and different policies may be compared and contrasted.

4. The general approach for identifying transactions related to a particular theme or topic is described in the SNA in terms of the compilation of satellite accounts. A satellite account is formed through the adaptation and rearrangement of the core structures of the SNA to suit particular objectives. For the objective of identifying environmentally related transactions the rearrangement is based on considering the purpose underlying each transaction and using so-called functional classifications.

5. As explained in this chapter, the first task is therefore to determine and define the main environmental activities, environmental goods and services and environmental producers. This is done in section 4.2.

6. Section 4.3 explains the compilation of two sets of information related to environmental activities – the Environmental Protection Expenditure Account (EPEA) and statistics on the Environmental Goods and Services Sector (EGSS). Each set of information presents a different perspective on environmental activities and answers different questions concerning the relationship between the economy and the environment.

7. The final sections, sections 4.4 and 4.5, consider a range of other environmentally related transactions, including environmentally related taxes and subsidies, permits and licences to use environmental assets and transactions concerning environmentally related fixed assets.

4.2 Environmental activities, goods and services

4.2.1 Introduction

8. To identify those industries and products that are characteristic of the environment, the traditional industry and product classifications are not sufficient and alternative classifications are needed. These are constructed by considering the purpose of different activities.

9. Using a purpose based approach, this section defines the environmental activities in the central framework and presents their scope and classification. The last parts of the section present different sets of environmental goods and services that are relevant in measuring the extent of environmental activities from a demand and supply perspective and the relevant groups of environmental producers.

4.2.2 The scope of environmental activities

10. Most focus in the analysis of environmental activities is on those activities that reduce or eliminate pressures on the environment and aim at making more efficient use of natural resources. Examples are investing in technologies designed to prevent or reduce pollution, restoring the environment after it has been polluted, and recycling, conservation and resource management.

11. As explained in Chapter 3 and Chapter 5, an important aspect of environmental and economic accounting is the measurement of the flow of natural resources into the economy. Hence, the activities of extracting and harvesting natural resources are also of interest. Finally, activities undertaken to reduce the impact on society of naturally occurring events such as floods and cyclones, are also considered environmental activities in the SEEA. While both of these activities are within scope of the full set of environmental activities in the SEEA they have not been the focus of much work in environmental and economic accounting and they are not generally actively measured in the satellite accounting approaches outlined in this chapter. Therefore, after providing brief definitions of these activities and defining some high level classes for natural resource use activities they are not further considered in any detail in the chapter.

12. These various activities are considered in the following four groups each of which is defined in this section.

    i. Environmental protection activities;
    ii. Natural resource management activities
    iii. Natural resource use activities;
    iv. Minimization of the impact of natural hazards.

13. As well as activities aimed at protecting the environment and managing natural resources, there are activities aimed at avoiding or treating damage resulting from an already polluted environment. Examples include expenditure associated with avoiding local noise or air pollution by moving house or changing job; expenditure on cleaning and restoring dirty or damaged buildings resulting from air pollution; and hospital treatment for people adversely affected by poor quality environments. The common focus in these examples is that these activities and expenditures relate to people and produced assets rather than to the environment

directly. Consequently, these activities are not considered environmental activities and are not discussed further in this chapter.

14. While some activities may only be undertaken for a single purpose, many activities are often undertaken for a variety of purposes. Following general principles of classification, activities are deemed to be environmental activities if the primary purpose of the activity is consistent with the definition of the four types of activity listed as environmental. These issues are discussed in Section 4.2.3.

15. In determining the primary purpose a variety of motivations for undertaking the activity may be relevant. The activity may be undertaken on a purely voluntary basis or in order to comply with relevant legislation or regulation or within the framework of a voluntary agreement.

16. A full description of the scope of environmental activities requires the definition and identification of activities, products and transactions that are of interest. All these are then brought together in satellite accounts or relevant statistics to allow specific types of analysis.

4.2.3 Definition of environmental activities

Environmental protection activities

17. Environmental protection activities are those activities whose primary purpose is the avoidance of the negative effects on the environment from economic activities. These activities include, but are not limited to, the prevention, reduction or treatment of waste and wastewater; the prevention, reduction or elimination of air emissions; the treatment and disposal of contaminated soil and groundwater; the prevention or reduction of noise and vibration levels; the preservation of ecological entities and landscapes; monitoring of the quality of the environmental media and the research and development (R&D); and the general administration and training and teaching activities oriented towards environmental protection.

Natural resource management activities

18. Resource management activities include activities aimed at reducing the extraction of natural resources, the reusing and recycling of natural resources, the replenishment of natural stocks of resources, and the general management of natural resources. The management of natural resources includes activities such as monitoring, control, surveillance and data collection. Resource management activities also include the production of goods and services to manage and conserve natural resources.

19. Resource management activities may result in associated secondary environmental benefits such as protection and restoration of wildlife and natural habitats. However, activities specifically for biodiversity or landscape protection, for example, management of protected forests, and activities aimed at preserving certain functions or the quality of the natural environment (air, water, soil and groundwater) should be treated as environmental protection.

Natural resource use activities

20. Natural resource use activities include abstraction, harvesting and extraction of natural environmental assets including exploration and development. These activities typically correspond to the standard economic industries for various natural resource-related industries such as fisheries, forestry, mining and water supply. Activities concerned with the transformation of natural resources into other products are not included as resource use activities.

21. Natural resource use activities exclude those activities, which while potentially very similar, concern the harvest of cultivated biological resources such as livestock, crops, aquaculture and cultivated timber resources.

Minimization of the impact of natural hazards

22. Activities aimed at the minimization of the impact of natural hazards on the economy and society include research, observation and measurement networks, surveillance, administration of hazard warning systems, provisions for fighting the effects of floods, forest fires and other natural hazards (including equipment), provisions for the evacuation of the population, and the building of structures to prevent hazards (for example, fire barriers in forests, avalanche prevention barriers, dams to slow down water flows, and renaturalization of river banks and other landscapes).

23. The collection and organisation of information on minimising the impact of natural hazards may be of particular interest in understanding the economic response to natural hazards and also provide indicators of the economic impacts of environmental changes to landscapes and water systems, including changes due to climate change.

24. At this stage there has been little development of environmental accounts relating to activities concerning the minimisation of the impact of natural hazards. Consequently, no recommendations regarding the measurement scope, classification or the compilation of tables are provided in the central framework.

4.2.4 Classification of environmental activities

25. Section 4.2.3 described the environmental activities in scope of the central framework. This section outlines the classification of these environmental activities – the Classification of Environmental Activities (CEA).

26. The CEA is a functional classification used to classify environmental activities, environmental products and environmental expenditures and other transactions. It covers the three types of environmental activities (environmental protection, resource management and resource use) for which statistical definitions are relatively advanced. The top level classes for the three groups of the CEA are outlined in Table 4.2.2. Within Group I: Environmental Protection the activities are classified by environmental domain such as air, waste and water. For Groups II and III the activities are classified by type of natural resource. Activities that are more broad ranging such as those relating to management and research are allocated to classes at the end of each group.

Table 4.2.2 Classification of Environmental Activities - Overview of groups and classes

Group	Classes
I: Environmental Protection (EP)	1 Protection of ambient air and climate
	2 Wastewater management
	3 Waste management
	4 Protection and remediation of soil, groundwater and surface water
	5 Noise and vibration abatement (excluding workplace protection)
	6 Protection of biodiversity and landscapes
	7 Protection against radiation (excluding external safety)
	8 Research and development for environmental protection
	9 Other environmental protection activities
II: Natural Resource Management (RM)	10 Management of mineral and energy resources
	11 Management of natural timber resources
	12 Management of wild fish resources
	13 Management of other natural biological resources
	14 Management of water resources
	15 Research and development activities for natural resource management
	16 Other natural resource management activities
III: Natural Resource Use (RU)	17 Use of mineral and energy resources
	18 Use of natural timber resources
	19 Use of wild fish resources
	20 Use of other natural biological resources
	21 Use of water resources

27. Annex 4.1 describes the lower level classes of the CEA and provides some additional information on the application of the CEA. Annex 4.1 also includes a discussion on boundary issues between environmental protection, resource management and resource use.

28. One of the key boundary issues concerns the treatment of activities associated with the production of energy from renewable resources and the treatment of activities associated with energy saving. To a large extent the treatment is likely to depend on the structure of the energy supply in each country. Consequently, for the purposes of international comparison, it may be necessary to consider the compilation of separate statistics on these activities outside the framework of the CEA.

4.2.5 Environmental goods and services

29. Based on the definitions of environmental activities it is necessary to determine the relevant set of economic transactions that should be identified. The focus in this section is to determine the relevant set of goods and services and later sections in the chapter consider transactions such as taxes and subsidies.

Characteristic and connected products and activities

30. Following the 2008 SNA, the identification of the relevant set of environmental transactions is determined by first defining those activities and products that are "characteristic" or typical of

the field of study. The relevant characteristic activities are the production of environmental protection and resource management services by economic units for sale to those undertaking the activities. Thus the characteristic products are considered to be environmental protection and resource management services.

31. Next, products are identified that are "connected" to the field of study and are clearly covered within the scope of expenditure for environmental purposes. An example of a connected product is the purchase of a car for undertaking aspects of resource management activity. The definition of characteristic and connected products defines the full scope of expenditures on environmental activities.

32. The definition of characteristic and connected products for environmental protection activities and the appropriate accounting for them is considered in detail in the compilation of Environmental Protection Expenditure Accounts (EPEA) explained in section 4.3. While the scope of the EPEA is defined from an expenditure or demand perspective, the recording of the supply of characteristic products, i.e. environmental protection services, is also an important component of these accounts.

Environmental goods and services from a supply perspective

33. An alternative approach to considering environmental goods and services is to consider a supply perspective. From this perspective the relevant goods and services are those that are typically considered environmental in terms of their technical properties. This set of goods and services includes the characteristic services mentioned above and also a range of goods and services that are either solely used for environmental purposes (known as sole-purpose products) or have been developed and designed such that they are considered to be beneficial for the environment. These goods and services, defined on their technical properties, are considered environmental goods and services in the SEEA. They are considered in more detail in the compilation of statistics on the Environmental Goods and Services Sector (EGSS) described in section 4.3.

4.2.6 Environmental producers

34. A set of environmental producers can also be defined. When environmental activity is analysed from a demand perspective, as in EPEA, the set of producers consists of those economic units who produce characteristic products, i.e. environmental protection and resource management services. When environmental activity is analysed from a supply perspective, the set of producers are all of those economic units who produce environmental goods and services, as defined by their technical properties.

35. In both cases, the economic units that specialise in the production of characteristic products, i.e. those whose primary activity is the production of characteristic products, are known as specialist producers. Non-specialist producers are those who produce and sell characteristic products as secondary output but have a different primary activity. From the supply perspective the set of relevant producers also includes those producers of other environmental goods and services.

36. Own-account producers are also included. These units produce characteristic products but do not sell the products to other economic units and instead consume the outputs themselves. Examples of

this type of production include depollution of exhaust gases and the own-account incineration of waste.

37. Following the 2008 SNA, own account production is not normally separately identified and rather the costs of undertaking the activity would be assumed to contribute to the overall costs of producing the primary or secondary output of the unit. However, in the SEEA, given the need to focus on specific environmental activities, wherever they occur in the economy, it is recommended that own-account production activities be separately identified wherever possible.

38. Many producers of environmental goods and services are government units that may either be specifically established to deliver these outputs (and hence would be considered specialist producers) or they may be part of larger government agencies. Some of these units may be non-market producers. Since the output of non-market units is measured in quite a different way (as the sum of costs) it is recommended that all government producers be clearly separated.

39. Many environmental protection and resource management activities are undertaken by household units. Where they are undertaken for sale they are treated as for any other specialist or non-specialist producer. Where the production is done on own-account the output should also be recognised in line with the measurement of own-account production as discussed. In this case the value of own-account production will also be reflected as household consumption.

4.3 Environmental expenditure accounts and statistics

4.3.1 Introduction

40. This section describes two different sets of information. The first set concerns the recording of expenditures and related national accounts flows in relation to specific environmental activities. Accounts of this type have been widely developed in relation to environmental protection, so called Environmental Protection Expenditure Accounts (EPEA). Accounts for other environmental activities are not as widely developed but can be compiled following the same concepts and definitions as for EPEA. For example, Resource Use and Management Expenditure Accounts (RUMEA) have been developed in some countries for some natural resources.

41. This section describes the compilation of EPEA as an example of what can be done in this area. The scope of the EPEA is defined from a demand perspective by the expenditures undertaken by economic units for environmental protection purposes. The total expenditure includes expenditure on characteristic products, i.e. environmental protection services, and expenditure on connected products. For environmental protection services both the supply and use of these services is considered but the full scope of characteristic and connected products is only analysed from an expenditure or use perspective.

42. EPEA are a type of functional satellite accounts as described in Chapter 29 of the 2008 SNA. The construction of EPEA closely follows the concepts, definitions and accounting rules of the national accounts but a certain degree of deviation from the standard is applied to either consider specificities of environmental aspects or the measurement objectives of the EPEA which are more targeted than the broader macro-economic focus of the core national accounts.

43. The second set of information focuses on the supply of environmental goods and services and is composed of a set of statistics describing the Environmental Goods and Services Sector (EGSS). These statistics include information on the production of the range of environmental goods and services including environmental protection and resource management services, sole-purpose products and other relevant goods and services. Statistics on the EGSS relate only to the production of these goods and services and do not cover the related demand aspects.

44. There is a reasonable degree of overlap between the EPEA and the EGSS but there are important differences. The final part of this section describes the relationship between EPEA and EGSS statistics.

4.3.2 Environmental Protection Expenditure Accounts (EPEA)

Purpose of EPEA

45. The EPEA is intended to respond to the following three questions.

    a. How much do resident units – either producers or consumers – pay and in what form for environmental protection?

    b. To what extent is this expenditure financed by different institutional units?

    c. What is the value of the environmental protection services produced by different economic activities?

46. Measuring the financial exposure of an economy to environmental protection helps to evaluate the influence of environmental protection costs on international competitiveness, the execution of the polluter pays principle and cost-effect analyses of environmental control mechanisms. Monetary data may also be used to examine the extent to which different economic agents internalise the actual costs of environmental protection in their decision-making. Additional analysis may also be supported by linking expenditure on environmental protection to physical data such as the amount of waste treated or the level of air emissions.

EPEA tables

47. There are a number of EPEA tables. The first table presents information on the supply of characteristic environmental protection products, i.e. environmental protection services. The second table articulates the demand for these services including showing the connection between total supply in basic prices and total use in purchasers' prices. The third table broadens the scope of demand to include all products purchased by those undertaking environmental protection activities. The total outlays by an economy on environmental protection is reflected in the aggregate national expenditure on environmental protection.

48. The third table includes flows of taxes, subsidies and other transfers relevant to the measurement of environmental protection. The consideration of these flows enables data to be organised to assess the financing of environmental protection. Environmentally related taxes, subsidies and other transfers are discussed in more detail in section 4.4.

Supply of environmental protection services

49. The supply of environmental protection services is shown in Table 4.3.1. In line with the discussion of environmental producers presented in section 4.2, the supply of environmental protection services can be broken down by specialist producers, non-specialist producers and own account producers. In addition government producers are separately identified noting that in most cases they are a sub-set of specialist producers.

50. The table shows output of environmental protection services and imports and shows the transition between basic prices and purchasers' prices for total supply. The table goes on to show a full range of industry relevant measures including intermediate consumption and other production related entries such as value added and compensation of employees. Where possible the intermediate consumption of these producers should be split into the consumption of environmental protection services and the consumption of other goods and services.

51. An additional entry is made for gross fixed capital formation and acquisitions less disposals of non-produced, non-financial assets such as land by specialist producers. Since the activity of specialist producers is primarily targeted toward environmental protection, all of their expenditure, including the purchase of capital equipment to undertake their production, is within scope of environmental protection expenditure. This does not apply to other producers.

Table 4.3.1 Production of environmental protection services

		Producers				Total
		Specialist producers*	Non-specialist producers	Own account producers	Government producers	
Output of environmental protection services						
Imports of environmental protection services						
Total supply at basic prices						
Taxes less subsidies on products						
Trade and transport margins						
Total supply at purchasers prices						
Intermediate consumption						
Environmental protection services						
Other goods and services						
Gross Value Added						
Compensation of employees						
Taxes less subsidies on production						
Consumption of fixed capital						
Net Operating Surplus						
Supplementary items						
	Labour input					
	Gross fixed capital formation					
	Acquisition less disposal of non-produced, non-financial assets					

* Includes specialist general government producers

52. All of the values in Table 4.3.1 are measured in a manner consistent with the accounting conventions of the 2008 SNA. Consequently, the aggregates such as gross value added and net operating surplus can be meaningfully compared to macro-economic aggregates such as GDP as derived from the core national accounts framework.

53. However, it is noted that the inclusion of own-account production extends the range of entries compared to the core national accounts and hence measures of output and intermediate consumption will be larger than if this activity were not separately identified.

Use of environmental protection services

54. The supply of environmental protection services is used by other economic units in the economy and may also be exported. These flows are recorded as in Table 4.3.2. The using economic units are shown as for a standard supply and use table with intermediate consumption of industries and final consumption of households and government units.

55. In Table 4.3.2 the use of environmental protection services is shown.

Table 4.3.2 Use of environmental protection services

		Purchasers					
		Industry		Households	General government	Rest of the world	Total
		Specialist producers	Other producers				
Total use of environmental protection services at purchasers' prices							

Expenditure for environmental protection purposes

56. Table 4.3.3 outlines a table relevant for the assessment of expenditure for environmental protection purposes. The aim is to record the total outlays of resident units for environmental protection purposes. Consequently its scope is broader than only goods and services but incorporates entries to account for payments made by different economic units such as taxes and subsidies that have a specific environmental protection purpose. These taxes and subsidies are discussed at greater length in section 4.4.

57. The scope of information on expenditure for environmental protection purposes is not limited to the use of environmental protection services. The scope covers expenditure on all products used for environmental protection. This includes (i) expenditure on environmental protection services, (ii) expenditure on so-called adapted or cleaner goods that have been specifically modified to be more environmentally "friendly" or "cleaner" and whose use is therefore beneficial for environmental protection including capital; and (iii) expenditure on other goods and services for environmental protection purposes.

58. The expenditure may relate to intermediate consumption, final consumption or gross fixed capital formation. There is potential for gross fixed capital formation to be recorded for environmental protection services in cases where the expenditure leads to improvements in land which, following the 2008 SNA, are treated as capital formation in land improvements. Exports are not included in this table as they represent expenditure by economic units in the rest of the world.

Table 4.3.3 Total national expenditure on environmental protection

		Purchasers					
		Industry		Households	General government	Non-profit institutions serving households	Total
		Specialist producers	Other producers				
Type of expenditure by product							
Environmental protection services							
	Intermediate consumption	NR					
	Final consumption						
	Gross fixed capital formation						
Adapted products							
	Intermediate consumption	NR					
	Final consumption						
	Gross fixed capital formation						
Connected goods and services for environmental protection purposes							
	Intermediate consumption	NR					
	Final consumption						
	Gross fixed capital formation						
Capital formation on non-environmental protection products for characteristic activities							
Specific transfers for environmental protection not included above							
Environmental protection transfers to and from the rest of the world (net)							
Total national expenditure on environmental protection							

59. While Table 4.3.3 provides the broad framework for the calculation of total national expenditure, a number of factors need to be considered.

Measurement of capital formation

60. Two types of gross fixed capital formation for environmental protection can be distinguished:

    i. Expenditure on end-of-pipe technologies used to treat, handle or dispose of emissions and wastes from production. This type of spending is normally easily identified even within the context of own-account activity because it is usually directed towards an "add on" facility which removes, transforms or reduces emissions and discharges at the end of the production process;

    ii. Expenditure on "integrated investments", also called cleaner technologies. These are new or modified production facilities designed so as to ensure that environmental protection is an integral part of the production process, thereby reducing or eliminating emissions and discharges and thus the need for end-of-pipe equipment.

61. Depending on the nature of the integrated investment expenditure can be estimated from the cost of the modification of existing equipment or based on the extra cost due to pollution control, energy savings and the like, i.e. the cost of "non-polluting or less-polluting" equipment is compared with that of "polluting or more-polluting" reference equipment.

62. Such estimates are difficult to make when reference equipment no longer exists or when new equipment presents other advantages in addition to its beneficial effects on the environment. These may include savings on or substitution of raw materials, higher productivity and so on which cannot be isolated in terms of cost. The difficulty arises because the steady integration of environmental standards into equipment and processes means that eventually it becomes impossible to identify a part of the expenditure as environmental. Given the different speeds at which new environmental standards are incorporated into different types of equipment and in different countries, comparison of long time-series across industries and countries becomes difficult. However, despite these measurement difficulties, a misleading picture may be obtained if the cost of capital equipment is ignored.

63. In addition to capital formation on environmental protection products there will be expenditure by specialist producers on other capital items required for the production of environmental protection goods and services. For example, the expenditure may include the purchase of buildings and transport equipment. These amounts should be recorded separately. The entry here should also include the net acquisition and disposal of non-produced non-financial assets, particularly land, undertaken by specialist producers.

Valuation of adapted goods

64. The value of adapted goods that should be included in the EPEA table of expenditures is only the extra cost of the more environmentally friendly component of the good compared to the normal or standard version of the good.

65. Typically, the method used to estimate the expenditure associated with the purchase of adapted goods is based on physical information about market sizes (amount of desulphurized fuels used, number of newly registered cars equipped with a catalytic converter, number of newly constructed houses equipped with septic tanks etc.). These estimates are then valued by either the market price or by the extra cost due to environmental protection features. Extra costs will normally be difficult to survey so that expert assessment and technical knowledge may be used to estimate extra costs (for example, the extra costs of producing desulphurized fuels or of environmental adaptations of vehicles).

66. A more general consideration is that if the purchase of adapted goods for environmental protection purposes results in a reduction in the overall operating costs for the purchasing business then these expected cost savings should be taken into account. For example, the cost of installing energy saving equipment should be included in environmental protection expenditure[1] but if there is also a reduction in the associated future energy bills this reduction should be offset against the cost of the equipment and only the net cost of environmental protection should be recognised.

[1] Where it is considered to be for environmental protection purposes rather than for resource management purposes.

Adjustments for intermediate consumption of specialist producers

67. Special consideration is required concerning the intermediate consumption of environmental protection services by specialist producers. In order to avoid double counting these costs must be deducted from total national expenditure on environmental protection expenditure as they are also reflected in the expenditure of other firms purchasing the environmental protection services from these producers. In principle this adjustment should also be made in relation to the intermediate consumption on environmental protection services used by non-specialist producers to the extent that these services are used to produce and sell environmental protection services on the market. The relevant cells are labelled NR – not required in Table 4.3.3.

Adjustments for specific transfers and financing by the rest of the world

68. There may be transfers between economic units that affect the level of spending on environmental protection but which are not recorded in the earlier estimates of expenditure shown in Table 4.3.3. For example, if government subsidises some environmental protection expenditure, then the extent of this subsidy will not be recorded in the expenditure recorded by the unit receiving the subsidy. It is noted that subsidies may be paid to and received from the rest of the world.

69. The case of earmarked taxes also needs consideration. Earmarked taxes are recorded where a direct link can be made between the tax revenue collected and expenditure on particular projects. Where the expenditure is for environmental protection purposes the relevant amounts of tax revenue should be recognised as earmarked taxes for environmental protection and recorded against the expenditure of the units paying the taxes. To be considered earmarked taxes, the payment must be considered a tax following the definitions of the 2008 SNA and there must be clear and unambiguous knowledge, often evidenced in legislation, that the tax revenue will be used for the specific purpose of environmental protection.[2]

Total national expenditure on environmental protection

70. With these considerations in mind, Total national expenditure on environmental protection can be defined as

    - Final consumption, intermediate consumption and gross fixed capital formation on all environmental protection goods and services
    - Less Intermediate consumption on environmental protection goods and services for environmental protection activities
    - Plus Gross fixed capital formation (including acquisition less disposal of non-produced non-financial assets) for environmental protection activities
    - Plus specific environmental protection transfers (including earmarked taxes) by residents units not captured in the items above;
    - Plus environmental protection transfers paid to the rest of the world;
    - Less environmental protection transfers received from the rest of the world.

[2] Depending on their tax bases earmarked taxes may also be considered environmentally related taxes, see section 4.4.

Financing environmental protection

71. The estimates of national expenditure on environmental protection show expenditure as undertaken by different units. This may not show who directly bears the cost because of specific transfers between units. This information, however, provides a valuable insight regarding who finances the national expenditure and how changing financing structures may influence expenditure decisions. For example, if an investment grant is not available, an enterprise may be much less likely to undertake the capital formation in environmental protection.

72. Amendments can therefore be made to the expenditure shown in Table 4.3.2 to show which units are directly responsible for the expenditures and which directly bear the costs of financing them. For both current and capital transfers related to environmental protection, the unit making the transfer has an increase in expenditure and the unit receiving the transfers has a reduction.

73. Many of the specific transfers will be subsidies and investment grants where government is the payer of the transfers and it is industries or households that benefit. An example of a transfer benefiting households may be a grant to improve house insulation or for other energy saving devices.

74. The entries in the column for the rest of the world correspond to the transfers paid for international cooperation in the field of environmental protection. These transfers can be financed either by the government, international organisations or by households through non-governmental organisations.

75. Making adjustments for these forms of transfers does not completely determine who ultimately bears the cost of environmental protection. Costs that initially fall to enterprises are eventually passed on to their customers. This applies to both intermediate consumption and the costs of new capital formation. As well, all government expenditure is funded (at least in large part) by taxes and thus is ultimately borne by those paying the taxes. However, further adjustments to examine the net cost burden of environmental protection are not presented here.

4.3.3 Environmental Goods and Services Sector (EGSS)

Purpose of the EGSS

76. The Environmental Goods and Services Sector (EGSS) looks at environmental activities from the supply perspective and analyses the production of environmental goods and services in as much detail as possible. Interest in statistics pertaining to the EGSS has been driven by the potential for employment, innovation and exports in this sector to be important parts of efforts to make economies more environmentally friendly and more resource efficient.

77. In principle there are a wide range of economic variables that might be considered within an EGSS context but due to complexity of measurement in this area focus has been on the variables that give an indication of the relative economic size and contribution of EGSS. Thus variables such as the output, value added and employment relating to environmental goods and services have been the initial focus.

Scope and definition of the EGSS

78. The EGSS consists of producers of all environmental goods and services. Environmental goods and services are those products that are produced for the main purpose of:

    i. preventing or minimising pollution, degradation or natural resources depletion (including the production of energy from renewable sources);
    ii. repairing damage to air, water, waste, noise, biodiversity and landscapes;
    iii. reducing, eliminating, treating and managing pollution, degradation and natural resource depletion;
    iv. carrying out other activities such as measurement and monitoring, control, research and development, education, training, information and communication related to environmental protection or resource management.

79. Thus products specifically designed and manufactured for purposes of environmental protection and natural resource management are within scope of environmental goods and services. This aligns with the intent of EGSS to provide information on the extent to which the economy may become more environmentally friendly and resource efficient.

80. In addition, adapted goods are included. These are goods that have been specifically modified to be more environmentally "friendly" or "cleaner" and whose use is therefore beneficial for environmental protection or resource management even though the primary purpose of the manufacture of the product may not be environmentally related. For example, the primary purpose of the production of more energy efficient light globes is lighting rather than environmental protection.

81. Excluded from the scope of environmental goods and services are goods and services produced for purposes that, while beneficial to the environment, primarily satisfy technical, human and economic needs or requirements for health and safety. Goods and services related to minimizing the impact of natural hazards are also not included. Finally, goods and services related to the extraction, mobilisation and exploitation of natural resources are excluded.

82. In setting the boundary between environmental goods and services and the set of products used for environmental purposes (see also Section 4.3.2), the application of the environmental purpose criteria moves from the user or purchaser to the technical nature of the product and its technical suitability to be used for environmental protection or resource management purposes.

83. In certain boundary cases, where the technical nature does not provide a definitive answer, consideration may be given to the intent of the producer of the product. However, the intended use of the product by the user or purchaser should not be taken into account.

84. In practice, to apply this definition it will be necessary for compilers to consider a full listing of different products and assess, for each product, whether or not it meets the criteria. It is noted that some environmental protection and resource management activities themselves generate outputs, in particular services that are specific to these two purposes. In these cases the technical nature of the services should be considered environmental.

Types of environmental goods and services

85. There are four broad types of environmental goods and services.

86. Sole-purpose products are goods (durable or non-durable goods) or services that directly serve an environmental protection or resource management purpose and have no use except for environmental protection or resource management. (For example, air pollution control devices).

87. Specific services are the service output of environmental protection or resource management activities. (For example, waste and wastewater management and treatment services.)

88. Environmental technologies are technical processes, installations and equipment (goods), and methods or knowledge (services) whose technical nature or purpose is environmental protection or resource management. Environmental technologies can be classified as either:

    i. End-of-pipe (pollution treatment) technologies which are mainly technical installations and equipment produced for measurement, control, treatment and restoration/correction of pollution, environmental degradation and resource depletion. These installations and equipment operate independently of or are identifiable parts added to, production and end-life consumption cycles. (For example, equipment to measure soil erosion, facilities for the containment of high-level radioactive waste)

    ii. Integrated (pollution prevention) technologies are technical processes, methods or knowledge used in production processes that are less pollutant and resource intensive than the equivalent "normal" technology used by national producers. Their use is less environmentally harmful than relevant alternatives. (For example, catalytic NOx purifiers, cars with environmentally friendly cooling)

89. Adapted goods are goods that have been specifically modified to be more environmentally "friendly" or "cleaner" and whose use is therefore beneficial for environmental protection or resource management.

90. The major complexity in defining adapted goods is that they exist only in relation to similar but non-environmentally friendly goods. This is also discussed in relation to EPEA (section 4.3.2). A key difference in EGSS is that the value of adapted goods is the total value of the good rather than the extra cost as applied in the EPEA. The full cost is included as the focus is on the supply perspective rather than the demand perspective.

Statistics on EGSS

91. The range of producers includes those who are specialist producers whose primary activity is either environmental protection or resource management, non-specialist producers and own-account producers, and government producers.

92. The basic structure of information concerning the EGSS follows the format presented in Table 4.3.4. For each type of producer the output may also be classified following the relevant parts of the CEA – that is, allocating the value of output to relevant classes of environmental protection activity or resource management activity as appropriate.

Table 4.3.4 Environmental Goods and Services Sector

			Producers			
			Specialist producers	Non-specialist producers and own account producers	Government producers	**Total**
		Technical nature				
Output						
	Sole-purpose products	Env. protection				
		Resource mgt.				
	Env. Specific services	Env. protection				
		Resource mgt.				
	End of pipe technologies	Env. protection				
		Resource mgt.				
	Integrated technologies	Env. protection				
		Resource mgt.				
	Adapted goods	Env. protection				
		Resource mgt.				
	Total Environmental goods and services					
	Other goods & services					
	Total output					
Share of environmental goods and services						
Intermediate consumption						
Gross Value Added						
Compensation of employees						
Employment						
Exports						

93. The size of the EGSS is not equal to the total output of all of the producers within scope of the EGSS. Most EGSS producers will output a range of other goods and services and therefore, the production of environmental goods and services may only be a relatively small component of their total output. This is recognised in the table by the inclusion of the output of other goods and services and the derivation of the share of environmental goods and services.

94. Output is measured following standard national accounts conventions and principles but special mention is made regarding the valuation of adapted goods. In the EPEA the valuation of adapted goods included only the extra cost of the environmentally beneficial component. In the EGSS the entire value of the output is included which is consistent with the valuation of such output in the core national accounts supply and use tables.

95. Special mention must also be made concerning the valuation of end-of-pipe technologies. Even though these outputs are embedded within a larger product it is necessary to attempt to value only the end-of-pipe technology itself rather than the complete product. For example, the inclusion of a catalytic converter in a car exhaust system results in the car containing an environmental end-of-pipe technology but only the value of the catalytic converter should be recorded as part of EGSS output – the entire value of the car should not be included.

96. Estimates of variables other than output such as intermediate consumption, gross value added, compensation of employees, employment and exports should relate purely to the production of environmental goods and services. Where direct estimates of these variables cannot be obtained one

approach is to multiply the total value for the producer by the output share of environmental goods and services. Since this assumes that the production function for the producer is the same for environmental goods and services and other goods and services estimates obtained using this approach should be assessed in conjunction with expert advice as available.

4.3.4 Relationship between EPEA and EGSS

97. While both EPEA and EGSS are focused on the measurement of environmental activities they so do from different perspectives and consequently there are important differences between them. The main differences are described in the following paragraphs.

98. Coverage of environmental activities The EPEA covers only environmental protection activities while the EGSS covers both environmental protection and resource management activity.

99. Coverage of environmental products The EPEA focuses on the characteristic activity of environmental protection services and, given its demand perspective, considers all goods and services that are used in undertaking environmental protection activity.

100. The EGSS, on the other hand, focus on those products that are characteristic of environmental protection and resource management and hence defines the scope of product from a technical production perspective. The EGSS thus includes specific services, sole-purpose products and environmental technologies that are intimately related to environmental protection and resource management. It also includes adapted goods that are considered beneficial for environmental protection and resource management.

101. Coverage relating to international trade. Both EGSS and EPEA record international trade – imports and exports consistently with the national accounts. However, it is noted that the aggregates of interest in EPEA include expenditure on imported products but exclude the production of exports, while in the EGSS, the production of products for export is included in aggregate EGSS output but the demand for imports is not considered.

102. Valuation. When valuing output the EGSS includes the total value of the products within scope including the total value of adapted goods. For the EPEA, the focus is on the cost incurred for environmental protection purposes and hence only the extra cost associated with the purchase of adapted goods is included.

103. Accounting structure. The EPEA follows a more complete accounting structure in linking the supply and use of environmental protection services with other relevant transactions in the sequence of accounts such as taxes and subsidies. The EGSS, at this stage of its development, focuses only on the supply of environmental goods and services.

4.4 Environmentally related transfers and similar flows

4.4.1 Introduction

104. There is a wide range of environmentally related transactions that are recorded in the core framework of the national accounts. Many of these transactions have been discussed in the previous section on the measurement of EPEA and EGSS. In that section, emphasis was placed on the purpose of the transaction either from the perspective of the producer or from the perspective of the purchaser and the types of transactions considered primarily related to output, intermediate consumption, final consumption and gross fixed capital formation.

105. This section focuses on other transactions in the core national accounts framework that can be regarded as environmentally related and hence of interest in the analysis of the economic aspects of the environment. Of particular interest are flows of environmentally related taxes and subsidies but these themselves are a sub-set of payments flowing to and from government.

106. The role of government in the interactions between the economy and the environment is of particular interest to many. For politicians and government officials, there is interest in whether various incentives or penalties can be effectively used to influence economic and human behaviour in relation to the environment. For households and businesses there is interest in knowing the costs and benefits involved in using natural resources and ecosystem services, such as using the atmosphere as a sink for pollution.

107. Many of the mechanisms by which economic behaviour is directed with respect to the environment involve payments to government, most commonly in the form of taxes, and payments by government in the form of subsidies and other transfers. These environmentally related transactions are recorded in the national accounts framework but are generally not separately identified as environmentally related. In order to permit the organisation of information about these transactions and to allow comparisons over time and across countries, the section describes the relevant definitions and boundary issues.

108. In addition to payments to and from government there are other transactions recorded in the national accounts that may be considered environmentally related and hence of interest in the analysis of environmental matters. Examples are donations made by households and businesses to non-profit environmental groups and expenditure on produced assets that are used in the management of environmental assets, such as the construction of water reservoirs.

4.4.2 Environmentally related transactions

109. Environmentally related taxes and subsidies must be considered within a broader framework of payments to and from government. This is required because following national accounting and government finance statistics guidelines there is generally a focus on how the payment relates to the production or consumption process rather than on the purpose of the payment. Thus, for example, taxes on income are clearly distinguished from taxes on goods and services.

110. Table 4.4.1 describes a broader framework of payments to and from government and similar transactions between other sectors. Potentially, all of these types of transactions may be environmentally related in nature. The remainder of this section describes each of these different payments and defines how the environmentally related status of a transaction should be determined.

Table 4.4.1 Selected payments to and from government and similar transactions

		Payments received by				
		Government	**Corporations**	**Households**	**NPISH ***	**Rest of the world**
Payments made by	**Government**	Transfers between levels of government	Subsidies Investment grants	Social benefits Current & capital transfers	Subsidies Current & capital transfers	Current and capital transfers
	Corporations	Taxes Fines Fees & charges Rent	Rent	Rent	Donations	
	Households	Taxes Fees & charges Fines			Donations	Donations
	NPISH *	Taxes	Current and capital transfers	Current and capital transfers		Current and capital transfers
	Rest of the world	Taxes Current transfers				

* Non-Profit Institutions Serving Households

4.4.3 Environmentally related payments to government

Environmentally related taxes

111. The majority of the different payments made to government are taxes. Taxes may be labelled in different ways and thus care must be taken to ensure that the underlying basis of the payment is well understood.

112. Taxes are compulsory, unrequited payments, in cash or in kind, made by institutional units to government units[3]. They are grouped in the following categories

- Taxes on production and imports
- Taxes on income
- Other current taxes
- Capital taxes.

113. The decision as to whether a payment regarded by the SNA as a tax is environmentally related is based on consideration of the tax base. Specifically, an environmentally related tax is 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. In practice this definition is applied by looking at all of the various taxes levied in a country and making an assessment as to whether the tax base in each circumstance is something that has a negative environmental impact.

114. The consideration of the tax base in the determination of the environmental status of a tax is an exception to the general approach to defining the environmental status on the basis of the purpose of the transaction. However, in the case of taxes, generally the payer does not know in advance as to what the tax payment might be used for by the government. Indeed, the primary purpose of taxation

[3] For details on the definitions of the different types of taxes refer to 2008 SNA paragraphs 7.71 – 7.97

in many cases will be the raising of funds to pay for general social services such as health and education.

115. In cases where the intended purpose of the tax is known, these taxes are considered "earmarked taxes". They are relevant in the calculation of environmental protection expenditure and are discussed in section 4.3.

Environmentally related tax bases and categories

116. There are four broad categories into which environmentally related taxes are generally grouped - energy, transport, pollution and resources.

i. *Energy taxes* This category includes taxes on energy products used for both transport and stationary purposes. The most important energy products for transport purposes are petrol and diesel. Energy products for stationary use include fuel oils, natural gas, coal and electricity. Taxes on fuel used for transport purposes should be shown as a separate sub-category of energy taxes.

   Taxes on carbon are included under energy taxes rather than under pollution taxes. There are several reasons for this. First, it is often not possible to identify carbon taxes separately in tax statistics, because they are integrated with energy taxes, for example via differentiation of mineral oil tax rates. In addition, they are partly introduced as a substitute for other energy taxes and the revenue from these taxes is often large compared to the revenue from the pollution taxes. This means that including carbon taxes with pollution taxes rather than energy taxes may distort international comparisons. If they are identifiable, carbon taxes should be reported as a separate sub-category within energy taxes. A special type of carbon taxes are tradable emission permits. The treatment of these permits is discussed in detail in section 4.5.

ii. *Transport taxes* This category mainly includes taxes related to the ownership and use of motor vehicles. Taxes on other transport equipment (e.g. planes), and related transport services (e.g. duty on charter or scheduled flights) are also included here as are taxes related to the use of roads. The transport taxes may be 'one-off' taxes related to imports or sales of the equipment or recurrent taxes such as an annual road tax. Taxes on petrol, diesel and other transport fuels are included under energy taxes.

iii. *Pollution taxes* This category includes taxes on measured or estimated emissions to air and water, and the generation of solid waste. An exception is taxes on carbon dioxide, which are included under energy taxes as discussed above. Taxes on sulphur are included here.

iv. *Resource taxes* This category typically includes taxes on water abstraction, extraction of raw materials and other resources (e.g. sand and gravel, forests). Consistent with the general scope of environmentally related taxes, payments to government that are treated as rent are excluded from resource taxes.

117. Table 4.4.2 shows a potential recording of environmentally related taxes. Where other payments to government are of particular significance they could be added within a table of this type.

Table 4.4.2. Environmentally related taxes

	Taxes on products	Other taxes on production	Taxes on income		Other current taxes	Capital taxes	**Total**
			Corporations	Households			
Energy taxes							
Carbon dioxide taxes							
Taxes on fuel used for transport							
Transport taxes							
Pollution taxes							
Resource taxes							
Total environmentally related taxes							
Non-environmentally related taxes							
Total taxes							
Share of environmentally related taxes							

Treatment of Value Added Tax

118. Generally, Value Added Taxes (VAT) are excluded from the definition of environmentally related taxes because they are considered to have no influence on relative prices in the same way that other taxes on environmentally related tax bases do (i.e. VAT is levied on a broad range of goods and services irrespective of their impact on the environment).

119. There is one exception to this general treatment. In principle, where the VAT is calculated on a price that includes a duty or tax already determined to be an environmentally related tax, the relevant amount of VAT (equal to the VAT rate multiplied by the amount of the environmentally related tax) should also be considered to be an environmentally related tax and classified based on the nature of the underlying tax base. Such a situation may occur when VAT on petrol/gasoline is calculated including the fuel duty paid on hydrocarbon oils. In practice, the ability to isolate this amount of VAT may be difficult depending on the breadth and complexity of the VAT system.

Other environmentally related payments to government

Rent

120. There are certain environmental assets, particularly mineral and energy resources, that are owned by government and payments to government are often required to be made by extractors of the resources since the government in these situations acts as both owner and taxation authority. These payments are treated as rent. Payments of rent in respect of mineral and energy resources are commonly referred to as royalties and, in resource endowed countries, these payments may represent an important component of total government revenue.

121. Rent is the income receivable by the owner of an environmental asset (the lessor or landlord) for putting the asset at the disposal of another institutional unit (a lessee or tenant) for use of the

asset in production.[4] Rent is distinct from rentals that are paid by users of produced assets to the owners of those assets. Examples include rentals paid on the hire of buildings or of equipment for use in production and the hire of cars for transport by tourists. Rentals are treated as payments for services.

122. Rent relates to a payment due for the use of an environmental asset for one accounting period. There may be a longer term lease permitting the extractor to operate for an extended period of time but the payment of rent is usually set on an annual basis. Payments of rent usually depend on the level of output of the extractor, usually determined on the basis of the value of sales of extracted resource (quantity extracted x resource price).

123. As the government is the taxation authority, it is possible for different arrangements to be established by which the government collects the rent it is due as owner of the environmental asset. Some of these arrangements may be in the nature of income taxes as defined in the 2008 SNA. In principle, amounts of income tax that relate to the income earned from the extraction of environmental assets should be treated as rent. In practice, separating the income tax payments that relate to extraction activity as opposed to other income earned by the extracting company may be difficult. Chapter 5 discusses in more detail the estimation of resource rent and the determination of the proportion that accrues to the different economic units.

Sales of goods and services

124. In a number of situations the government undertakes a range of activities that provide goods and services to households and businesses. Such sales of goods and services constitute production by general government units and are often referred to as "fees". A common situation is the payments made to general government units that operate waste collection schemes for the disposal of waste. In some cases making the distinction as to whether these payments are sales of goods and services or taxes can be difficult to assess. The general guidance in the 2008 SNA should be followed.[5]

Fines and penalties

125. Fines and penalties are distinguished from taxes as being compulsory payments imposed on institutional units by courts of law or quasi-judicial bodies.[6] These payments to governments are treated as miscellaneous current transfers and need to be distinguished from payments of taxes and sales of goods and services. It may well be that some fines and penalties are related to illegal environmental activity and hence may be of interest in the context of environmentally related payments to government. The recording of fines and penalties also arises in the case of the use of environmental assets as sinks – see section 4.5.

Summary

126. Only those payments that are considered to be taxes according to the definitions of the 2008 SNA are within scope of environmentally related taxes in the SEEA. At the same time, there may be particular interest in recording other payments to government that are environmentally related such

[4] See 2008 SNA paragraph 7.154
[5] See 2008 SNA paragraphs 7.80 and 8.64.
[6] See 2008 SNA paragraph 8.135.

as those just described. In determining the environmental status of these payments focus should remain on the basis for the payment rather than on either the name used to describe the payment or the purpose for which the revenue raised may be used.

4.4.4 Environmentally related payments by government

127. Payments by government are recorded in a number of ways in the national accounts and government finance statistics. The treatment largely depends on how the payments relate to production and consumption and whether they are considered to be current or capital in nature.

128. Often payments by government are generically labelled subsidies. However, in economic accounting only certain transactions are treated as subsidies. The following paragraphs outline the relevant definitions for the various payments by governments.

129. All of the payments to be considered in this section are, in the first instance, considered transfers. A transfer is a transaction in which one institutional unit provides a good, service or asset to another unit without receiving from the latter any good, service or asset in return as a direct counterpart.[7]

Environmentally related subsidies and similar transfers

130. Subsidies and similar transfers are comprised of a range of transfers defined following the 2008 SNA. The other types of transfers within scope are Social benefits to households, Investment grants and Other current and capital transfers.[8] Generally, the most significant flow relates to subsidies which are current unrequited payments that government units, including non-resident government units, make to enterprises on the basis of the levels of their production activities or the quantities or values of the goods or services that they produce, sell or import.

131. The decision as to whether a particular payment by government is environmentally related is based on consideration of the purpose of the payment. From an analytical perspective the primary focus is to determine how much expenditure is being allocated towards achieving environmental outcomes. Thus, a subsidy or similar transfer should be considered to be environmentally related when the intent or purpose of the government is that money be used for either environmental protection or resource management purposes.

132. The environmental status should not be determined on whether the use of the expenditure results in positive outcomes for the environment.

133. It is likely that payments of subsidies and similar transfers are motivated by a number of different purposes. In principle, the scope of environmentally related subsidies and similar transfers should be limited to those payments whose primary purpose is environmental protection or resource management. However, in practice, it may be relevant to consider the inclusion of other payments that have an environmental protection or resource management purpose but for which the primary purpose is something different, for example supporting regional development.

134. For analytical purposes an aggregate measure of these different payments may be compiled. The aggregate measure of environmentally related subsidies and similar transfers paid by

[7] 2008 SNA, paragraph 8.10
[8] For detailed descriptions of these transfers refer to 2008 SNA paragraphs 7.98 – 7.106, 8.87 – 8.140 and 10.200 – 10.212.

government is the summation of all those types of transfers listed above that are considered to be environmentally related based on the purpose of the payment. The value of the payments that should be included is the total amount of the payments not only that proportion considered to be for environmental purposes.

Classification of environmentally related subsidies and other transfers

135. Since the definition of environmentally related subsidies and similar transfers is based on the assessment of environmental protection and resource management purposes then, in principle, it is possible to consider the use of the Classification of Environmental Activities (CEA) Part I (Environmental Protection Activities) and Part II (Resource Management Activities).

136. For analytical purposes it may be relevant to separate the transfers into those of a current and capital nature following the definitions in the 2008 SNA.[9] It may also be useful to classify the transfers by the industry or institutional sector of the recipients using ISIC or standard SNA institutional sector classifications.

Potentially environmentally damaging subsidies

137. The definition of environmentally related subsidies and similar transfers focuses on the government's intention rather than on the effect of the transfers. Another perspective is whether the size and structure of payments to and from governments are environmentally beneficial or environmentally damaging. To this end the concept of Potentially environmentally damaging subsidies (PEDS) has been developed encompassing subsidies and similar transfers that support activities that are considered environmentally damaging and also so-called implicit subsidies such as preferential tax rates.

138. No definition or measurement approach for PEDS is provided in the SEEA. This is because there is no clear limit on the activities and purposes that might be used to define a scope for PEDS and hence the approach to defining the environmentally related nature of a transfer based on primary purpose cannot be applied. Also, for implicit subsidies, there is no actual transaction or monetary flow between institutional units and hence the flow is not recorded in the national accounts or government finance statistics.

Environmentally related transfers by non-government institutional units

139. While taxes and subsidies are flows that, by definition, are received by or paid by government units the other types of flows outlined in this section can take place between other institutional units. For example, farmers may pay rent to landowners for the use of agricultural land and households may donate money to conservation groups recorded as other current transfers.

140. Where information on these flows is of interest, the amounts to be recorded as environmentally related should follow the same principles as applied in the case of government flows, i.e. transfers paid to other institutional units should be based on whether the primary purpose of the payer is environmental protection or resource management. Further, payments for the use of

[9] 2008 SNA, paragraph 8.10

environmental assets should be considered environmentally related payments. These types of payments are discussed in more detail in section 4.5.

141. A particular instance of transfers between institutional units concerns flows between international organisations and national governments and other resident institutional units. In certain countries these flows may be significant. In line with the general principles outlined here transfers paid by international organisations to institutional units within a country should be considered to be environmentally related if the intent of the international organisation is that the money is spent for environmental protection or resource management purposes.

4.5 Transactions concerning environmentally related assets

4.5.1 Introduction

142. The final set of environmentally related transactions of interest are transactions concerning environmental assets and transactions concerning fixed assets used in environmental activities. A particular focus is on the appropriate accounting entries to record permits for the use of environmental assets as a sink.

143. Transactions relating to the use of environmental assets are also discussed in Chapter 5 and should be considered within the broader set of asset accounts entries outlined in that chapter.

144. Transactions concerning fixed assets used in environmental activities relate primarily to the accounting entries required to consider the full cost of produced assets and in particular, taking into account the cost of disposing of produced assets at the end of their operational life and the remediation of the surrounding environment.

4.5.2 Permits to use environmental assets

145. A common and important mechanism for managing the interaction between the economy and the environment is the use of permits and licences to access, extract or use environmental assets. In some cases the permits and licences may relate to the physical removal of environmental assets such as in the case of fishing licences and in other cases they may relate to the use of the environment as a sink for emissions.

146. Payments for these permits and licences are economic transactions and are important in the context of complete economic and environmental accounting. Increasingly, the permits that are granted can be traded in markets thus creating potential assets for the holders of the permits beyond the benefits that are obtained from the use of the environmental assets themselves.

147. This section outlines the range of different arrangements that are generally encountered and describes the appropriate treatment of the payments following the treatments defined in the 2008 SNA. It is noted that compilers will often need to make on balance decisions on the appropriate treatment depending in the precise nature of the way in which the permits and licences are granted and can be exercised. The section is structured by first considering payments to extract and harvest natural resources and then considering payments to use the environment as a sink for emissions.

Permits to extract and harvest natural resources

148. The 2008 SNA outlines a range of general considerations that should be taken into account in determining an appropriate treatment.[10] The following is structured to consider relevant issues from the perspective of different types of natural resources and the common licensing and permit arrangements.

[10] See 2008 SNA paragraphs 17.313 – 343.

Mineral and energy resources

149. Mineral resources differ from other natural resources in that all extraction necessarily reduces the amount of the resource available for the future. The owner (in many but not all circumstances government) generally does not have a productive activity associated with the extraction but generally payments of rent are made on a regular basis based on the amount of the resource that is extracted. Payments of rent are discussed in Section 4.4 and the appropriate asset and income account entries to record the ownership and use of mineral and energy resources are discussed in Chapter 5, Section 5: Asset accounts for mineral and energy resources.

Land and soil resources

150. Land (and the associated soil resources) may be sold outright when the legal ownership is transferred from one institutional unit to another. Land is also the type of asset most frequently subject to a lease. Commonly, farmers leasing land pay regular rent to the owner of the land and these flows are recorded in the allocation of primary income account.

Timber resources

151. If a unit is given permission to log an area of land containing natural timber resources, or to log at its discretion without any restriction in perpetuity, the payments made to the owner constitute the sale of both the timber resources and the associated land.

152. However, it is more common for logging to be allowed under strict limits with a fee payable per unit volume of timber removed. The limits are usually such that the harvest of timber satisfies conditions required for a sustainable yield and so the payments are recorded as rent in the allocation of primary income account.

Fish resources

153. Fishing quotas established by national and international agreement may be allocated in perpetuity or for extended periods to particular institutional units. In such circumstances the quotas may be transferable and if so, there may be a well developed market in them. Fishing quotas may therefore be considered as permits to use a natural resource that are transferable and in these situations the quotas are considered assets in their own right.

154. An alternative regime is to issue a permit for a strictly limited period of time, less than a year, to a nominated institutional unit, often a non-resident. This is a common practice in some islands in the South Pacific, for example. In these cases the revenue from the licences should be recorded as rent in the allocation of primary income account.

155. A licence for recreational fishing is considered, by convention, as payment of a tax.

Water resources

156. A body of water with an economic value can be sold in its entirety either as part of the land that surrounds it or as a separate entity.

157. It is unlikely that economic ownership would be ceded under a long term resource lease with no

preconditions on the quantity and state in which a similar amount of water should be returned to the owner. However, it is possible that an area of water could be leased under a long term lease for recreational purposes, for example. The treatment of such leases should be as for land.

158. Of increasing interest is the extraction of water from water bodies. Regular payments for the extraction of water (as opposed to the delivery of it) should be treated as rent.

Permits for the use of the environment as a sink

159. In addition to recording transactions in relation to payments for the right to extract and access environmental assets, a separate set of considerations is required to record transactions that relate to the capacity to undertake specific activities involving the environment. Specifically, this relates to the right to use the environment, i.e. the soil, water, air and associated environmental assets, as a sink for emissions from economic activity.

160. A number of treatments may apply depending on the nature of the arrangements in place. The following scenarios and treatments are the most common. The treatments align with the definitions of the various payments to government outlined in section 4.4 and the same considerations as presented there should also be considered in the following scenarios.

i. The government may require payments in situations where there are illegal emissions of pollutants beyond certain levels. If these payments are intended to reduce or inhibit discharge and emissions in the future, they should be treated as fines.

ii. If the payments are linked to remedial action following the release of the emission or discharge, the payment is treated as a payment for a service unless the amount charged is out of all proportion to the remedial costs involved in which case the payment should be treated as a tax.

iii. If a limited number of permits to discharge or emit are issued with the intent to ultimately restrict the overall quantity of discharges and emissions, the treatment of any payment associated with the permits depends on the ownership of the environmental asset into which the emission has been or will be released.

    a. Where the economic ownership is established following the principles of the SNA, most commonly this occurs with land and soil, and the necessary conditions are met concerning the terms on which the discharge is permitted, then the payment for the permit should be treated in the same way as the payment for a licence to use an environmental asset.
    b. Where the economic ownership is not established following the principles of the SNA then the payment for the permit should be treated as a tax. This is the common situation with regard to the atmosphere, inland water resources and the seas and this treatment generally applies to carbon emission permit schemes.

161. Increasingly, permits are issued that are tradable and there is an active market in them. Permits concerning carbon emissions are the most significant for most countries. The complete accounting treatment for tradable permits is still the subject of international discussion under processes managed by the Inter-Secretariat Working Group on National Accounts. The treatment for the final draft of this document will be determined following resolution of the treatment through the ISWGNA processes.

4.5.3 Environmentally related transactions concerning fixed assets

162. Fixed assets cover the range of produced assets that contribute to production processes over a number of accounting periods. They include buildings, machines, various types of equipment including transportation equipment, land improvements and intellectual property products such as software and research and development expenditure. In undertaking different environmental activities different types of fixed capital will be used. Often there is interest in the fixed assets used to extract and harvest natural resources and there will also be interest in the amount of investment that takes place in fixed assets for environmental protection or resource management purposes. For example, information on the amount of investment in equipment to capture energy from renewable sources may be of interest.

163. This section describes the types of fixed assets that are likely to be of most interest in environmental accounting. A particular issue in the case of environmental accounting is the appropriate accounting for the costs of the disposal of fixed assets, a process that can have significant environmental impacts. Because of its importance this topic is covered in detail in this section.

Environmentally related types of fixed assets

164. Environmentally related types of fixed assets can be grouped into three broad categories. The first category covers types of fixed assets that are also environmental assets. These include animals that produce outputs on an ongoing basis such as various breeding stock, dairy cows for milk and sheep for wool; and plants that yield multiple outputs such as vineyards, orchards and rubber plantations. These are all types of cultivated biological resources and, even though they are fixed assets, they have a clear interdependence with the environment and are therefore considered environmental assets. The accounting for these assets is explained in Chapter 5.

165. The second category covers assets that are generally only used in undertaking environmental activities, i.e. environmental protection, resource management and resource use. Examples include oil rigs, dam walls, turbines for the generation of hydroelectric power and specialised air filtering equipment.

166. The third category covers fixed assets that do not represent specialised forms of assets but are used in undertaking environmental activities. For example, establishments specialising in environmental protection or resource management are likely to use cars and computers. In order to fully account for the expenditures and production processes of these establishments it is necessary to capture all forms of fixed assets that are used.

167. The accounting treatments for fixed assets is explained in detail in the 2008 SNA (particularly Chapter 10) and the same accounting rules and conventions are applied in the SEEA.

Environmental consequences of disposing of fixed assets

168. To provide a complete accounting for fixed assets it is necessary to consider the costs incurred to prevent environmental problems when production or operation ceases and use of fixed assets ends. For example when

i. Nuclear power plants are decommissioned and final storage of nuclear waste must be provided;

ii. Oil rigs and other mining equipment are dismantled and removed;

iii. Landfills are sealed, gas and leakage collection systems completed, and monitoring equipment installed,

iv. Mines are closed and mining slag heaps are treated to minimise leaching.

169. In aggregate these costs are referred to as decommissioning costs. Two types of decommissioning costs are defined – terminal costs and remedial costs. Terminal costs are costs that can and should be anticipated during the production periods prior to closure. Provision should be made to meet them during the life of the asset. Remedial costs are incurred when production has already ceased with no provision having been made for the taking of remedial action while production was in progress. Examples are the rehabilitation of sites contaminated by past activities, for example, fuel storage sites, and former landfill and abandoned mining sites.

170. The key distinction between terminal and remedial costs relates to timing of the costs and who incurs these costs since the nature of the goods and services purchased may be very similar. Terminal costs are incurred by the enterprise that owns the associated asset (oil rig, nuclear power plant etc.) and form part of the link between the value of the asset to the enterprise and the value of services rendered by the asset over its life. In principle they should be anticipated by the owner of the asset even if the expenditure only takes place at the end of the operation of the asset.

171. On the other hand, remedial costs are incurred after operations at a site have ceased and, generally, are incurred by a unit other than the operator of the site.[11]

Consumption of fixed capital

172. As decommissioning costs are associated with measuring the use of fixed assets in the SNA, this discussion commences with a short introduction to the concept of consumption of fixed capital and its links to the value of fixed assets. Broadly, the economic assumption is that the cost of purchasing an asset, at any stage of its useful life, is equal to the net present value (NPV) of the expected stream of income arising from the use of the asset over the remainder of its asset life.

173. The using up of an asset over time through its use in production is accounted for by means of an allowance for consumption of fixed capital (commonly known as depreciation). This is calculated as the decrease in the net present value of the future income stream expected from the continued use of the asset. In short, consumption of fixed capital represents the decline in value of the asset due to its use in production. This allowance should be deducted from income and recognised as a cost of production.

[11] There may be cases in which a particular operation ceases but the owner of the site remains the same, e.g. land owned by government. The relevant costs should be considered remedial if they cannot be attributed financially to the original operation.

The treatment of terminal costs

174. In principle, the value of consumption of fixed capital cumulated over the life of an asset, once price changes are taken into account, should be equal to the difference between the acquisition and disposal values. In the case of assets with actual costs at the time of disposal, this means that consumption of fixed capital should cover anticipated terminal costs since these costs lower the disposal value. Terminal costs should therefore be written off over the whole life of the asset, regardless of the number of owners during the life of the asset.

175. Immediately before the disposal, the value of the asset will have a negative value that is reduced to zero when the terminal costs incurred are treated as gross fixed capital formation. The apparent oddity of an asset with negative value reflects the fact that the owner not only could not sell it but would have to pay another unit to take over responsibility for the asset[12].

176. To estimate anticipated terminal costs, it is necessary to estimate not only the extent of these costs, but also their likelihood. In this regard terminal costs present a dual problem— (i) it is often difficult to anticipate their final size, and (ii) businesses may seek to avoid responsibility for these costs. Businesses may avoid these costs by suggesting a surety/bond based on vastly understated terminal costs; declaring bankruptcy when terminal activity is imminent; or ceasing business in the country in which operations have taken place.

177. There is the added factor that between the initial estimate of terminal costs and the time at which the terminal costs actually incurred, community standards may have changed markedly— meaning that the final terminal costs are meeting very different standards to those initially anticipated. This is especially true of operations conducted over very lengthy time periods.

178. Nonetheless, there are a number of indications that terminal costs can reasonably be expected: (i) if an upfront bond (or some other form of surety) has been provided; (ii) if the enterprise is required to progressively put in place contributions to fund the final decommissioning activities; (iii) the past record of the enterprise; and (iv) the strength and commitment of the government of the country in which operations are taking place.

179. Terminal costs should be recorded as gross fixed capital formation only at the time incurred but the deduction of these costs from income via consumption of fixed capital should be made progressively over the life of the asset. That is, consumption of fixed capital is charged against income before the disposal/terminal costs are incurred (or fully known).

180. Since terminal costs must be estimated before being incurred, the following four accounting scenarios need to be considered.

i. In situations where the terminal costs ultimately incurred exceed the cumulated consumption of fixed capital allowance, the full costs are still treated as gross fixed capital formation and any amount not already covered by consumption of fixed capital during the life of the asset is written off at the time the costs are incurred as consumption of fixed capital. This is a pragmatic recommendation and will lead to net value added to be over-stated during the periods the asset is in use and under-stated in the period when the remaining costs are incurred[13].

12 2008 SNA, paragraph 10.161

13 2008 SNA paragraph 10.162

ii. Where no estimates of terminal costs have been made during the life of the asset any terminal costs should be treated as gross fixed capital formation and then immediately written off as consumption of fixed capital, provided that they are paid by the operator.

iii. Where terminal costs are anticipated and a consumption of fixed capital allowance is recorded but the terminal costs are never actually incurred by the operator, the initial estimate of terminal costs must be removed from the balance sheet via the other changes in volume of assets account. Any subsequent decommissioning costs incurred by units other than the operator are treated as remedial costs.

iv. If terminal costs are overestimated compared to actual terminal costs subsequently incurred, this overestimate is corrected in the asset account through an entry of other changes in volume.

Treatment of remedial costs

181. For costs of a remedial nature, these costs are often incurred after a site has been closed and the operator has left. There are two main types of remedial costs (i) expenditures to restore land to allow its use for some other purpose; or (ii) expenditures to ensure no harmful emissions from deposits of pollutants and other residuals created by past activity are able to leach into surroundings and cause environmental damage. In both cases the relevant expenditures should be treated as gross fixed capital formation and give rise to a fixed asset – land improvement.

182. For remedial costs there is no special consideration required as to the timing of reporting or questions over whether the costs are anticipated, since, by definition, these costs are incurred after the operations at the site have ceased and are not incurred by the operator of the site who caused the need for the remediation.

183. In cases where environmental protection expenditures are incurred on an ongoing basis such that environmental damage is either inhibited or reduced on a continuing basis then these expenditures should be treated as intermediate consumption of the owner at the time they are incurred and not recorded as either terminal or remedial costs.

Annex A4.1: The Classification of Environmental Activities (CEA)

Introduction

1. The Classification of Environmental Activities and expenditures (CEA2011) is composed of three groups each representing one type of environmental activity.
    i. Environmental Protection (EP)
    ii. Natural Resource Management (RM)
    iii. Natural Resource Use (RU)
2. Each group is subdivided into "classes" (1-digit categories). Classes are in turn subdivided into 2-digit and 3-digit categories that have the main function of guiding classification into the classes.
3. This Annex describes each group and presents the classes and categories of each group.

Environmental Protection (EP)

4. Environmental Protection includes all actions and activities that are aimed at the prevention, reduction and elimination of pollution as well as any other degradation of the environment.[14] This includes measures taken in order to restore the environment after it has been degraded due to the pressures from human activities.
5. This definition implies that to be included under environmental protection, actions and activities must satisfy the primary purpose criterion, i.e. that environmental protection is their prime objective. Actions and activities which have a favourable impact on the environment but which serve other goals do not come under environmental protection. Hence, excluded from the field of environmental protection are activities that, while beneficial to the environment, primarily satisfy technical needs or the internal requirements for hygiene or security of an enterprise or other institution.[15]
6. With reference to the "functions" of environmental assets, environmental protection (EP) activities preserve and maintain the sink and service functions provided by all kinds of environmental assets covered by the SEEA, except for the mineral and energy resources which are mainly relevant from the point of view of their resource functions.

Natural Resource Management (RM)

7. Resource Management includes all actions and activities that are aimed at preserving and maintaining the stock of natural resources and hence safeguarding against depletion. This includes actions and activities aiming at reducing the withdrawals of natural resources (recovery, reuse, recycling, substitution of natural resources) as well as restoring natural resource stocks (increases/ recharges of natural resource stocks).

[14] The European System for the Collection of Information on the Environment (SERIEE 1994), Eurostat, paragraph 2006.
[15] Ibid. paragraph 2007.

8. To be included under resource management, actions and activities or parts thereof must satisfy the primary purpose criterion, i.e. that resource management is their prime objective.
9. With reference to the "functions" of environmental assets, resource management (RM) activities and expenditures relate to the resource functions of all natural resources covered by the SEEA except for soil resources which are mainly protected through EP activities.

Natural Resource Use (RU)

10. Resource Use (RU) includes all actions and activities that are aimed at the abstraction, harvesting and extraction of natural assets, including exploration and development. The abstraction of water is also included.
11. The standard classification of economic activities (ISIC) includes several activities that are typically resource-related industries, such as fisheries, forestry, mining and water supply. These industries carry out RU activities as their main activity. RU activities can be also carried out as secondary or ancillary activities.

Table A4.1 Classification of Environmental Activities – CEA2011: Overview of groups and classes

Group	Classes
I: Environmental Protection (EP)	1 Protection of ambient air and climate
	2 Wastewater management
	3 Waste management
	4 Protection and remediation of soil, groundwater and surface water
	5 Noise and vibration abatement (excluding workplace protection)
	6 Protection of biodiversity and landscapes
	7 Protection against radiation (excluding external safety)
	8 Research and development for environmental protection
	9 Other environmental protection activities
II: Natural Resource Management (RM)	10 Management of mineral and energy resources
	11 Management of natural timber resources
	12 Management of wild fish resources
	13 Management of other natural biological resources
	14 Management of water resources
	15 Research and development activities for natural resource management
	16 Other natural resource management activities
III: Natural Resource Use (RU)	17 Use of mineral and energy resources
	18 Use of natural timber resources
	19 Use of wild fish resources
	20 Use of other natural biological resources
	21 Use of water resources

Table A4.2 Environmental Protection Group: list of classes and related categories

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 for the protection of ambient air and climate

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 wastewater management activities

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 waste management activities

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 for the protection and remediation of soil, groundwater and surface water.

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 noise and vibration abatement activities

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 for the protection of biodiversity and landscapes

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 for protection against radiation

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 and development on environmental protection

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

Source: Classification of Environmental Protection Activities and expenditures – CEPA2000

Remarks:

- General classification principles: Classification should be made according to the main purpose taking into account the technical nature as well as the policy purpose of an action or activity. Multi-purpose actions, activities and expenditure that address several CEA classes of the EP group should be divided by these classes. Classification under the heading 'indivisible expenditure and activities' should only be made as a last resort.
- Classification of transversal activities: Transversal activities are research and development (R&D), administration and management as well as education, training and information. All R&D activities related to environmental protection should be allocated to CEA 8. Administration and management as well as education, training and information related to environmental protection should, to the extent possible, be allocated to the 'Other' categories within CEA classes 1-7. When these activities concern simultaneously two or more classes they should be allocated respectively to categories 9.1 or 9.2.

Table A4.3: Resource Management group of CEA: list of classes and related categories

10 MANAGEMENT OF MINERAL AND ENERGY RESOURCES

- 10.1 Reduction of the intake of mineral and energy resources
- 10.2 Reduction of minerals use through the reduction of scraps and the production and consumption of recycled materials and products. Reduction of heat and energy losses and energy savings
- 10.3 Measurement, control, laboratories and the like related to mineral and energy resources
- 10.4 Other activities for the management of mineral and energy resources

11 MANAGEMENT OF NATURAL TIMBER RESOURCES

- 11.1 Reduction of the intake of natural timber resources
- 11.2 Reduction of the consumption of forest (wood and non wood)-related products
- 11.3 Reforestation and afforestation
- 11.4 Forest fires
- 11.5 Measurement, control, laboratories and the like related to natural timber resources
- 11.6 Other activities for the management of natural timber resources

12 MANAGEMENT OF WILD FISH RESOURCES

- 12.1 Reduction of the intake of wild fish resources
- 12.2 Replenishment of wild fish stocks
- 12.3 Measurement, control, laboratories and the like related to wild fish resources
- 12.4 Other activities for the management of wild fish resources

13 MANAGEMENT OF OTHER WILD FLORA AND FAUNA

- 13.1 Reduction of the intake of wild flora and fauna (excl. timber and fish resources)
- 13.2 Replenishment of wild flora and fauna stocks (excl. timber and fish resources)
- 13.3 Measurement, control, laboratories and the like related to wild flora and fauna (excl. timber and fish resources)
- 13.4 Other activities for the management of wild flora and fauna (excl. timber and fish resources)

14 MANAGEMENT OF WATER RESOURCES

- 14.1 Reduction of the intake of water resources
- 14.2 Reduction of water losses and leaks, water reuse and savings
- 14.3 Replenishment of water resources
- 14.4 Measurement, control, laboratories and the like related to water resources
- 14.5 Other activities for the management of water resources

15 RESEARCH AND DEVELOPMENT ACTIVITIES FOR NATURAL RESOURCE MANAGEMENT

- 15.1 Mineral and energy resources
- 15.2 Natural timber resources
- 15.3 Wild fish resources
- 15.4 Other wild flora and fauna
- 15.5 Water resources
- 15.6 Other R&D activities for natural resource management

16. OTHER NATURAL RESOURCE MANAGEMENT ACTIVITIES

- 16.1 General administration of natural resources
  - 16.1.1 General administration, regulation and the like
  - 16.1.2 Environmental management
- 16.2 Education, training and information
- 16.3 Activities leading to indivisible expenditure
- 16.4 Activities not elsewhere classified

Remarks:

- General classification principles: Classification should be made according to the main purpose taking into account the technical nature as well as the policy purpose of an action or activity. Multi-purpose actions, activities and expenditure that address several CEA classes related to natural resource management should be divided by these classes. Classification under the heading 'indivisible expenditure and activities' should only be made as a last resort.
- Classification of transversal activities: Transversal activities are research and development (R&D), administration and management as well as education, training and information. All R&D activities related to natural resource management should be allocated to CEA 15. Administration and management as well as education, training and information related to natural resource management should, to the extent possible, be allocated to the 'Other' categories within CEA classes 10-14. When these activities concern simultaneously two or more natural resource classes they should be allocated respectively to categories 16.1 or 16.2.

Table A4.4 Resource Use group of CEA: list of classes and related categories

17 USE OF MINERAL AND ENERGY RESOURCES
- 17.1 Exploitation of mineral and energy resources
- 17.2 Exploration and discovery of new mineral and energy resources

18 USE OF NATURAL TIMBER RESOURCES
- 18.1 Exploitation of natural timber resources
- 18.2 Exploration of natural timber resources

19 USE OF WILD FISH RESOURCES
- 19.1 Exploitation of wild fish resources
- 19.2 Exploration and research of new fish resources

20 USE OF OTHER WILD FLORA AND FAUNA
- 20.1 Exploitation of wild flora and fauna resources (excl timber and fish resources)
- 20.2 Exploration and research of new wild flora and fauna resources (excl timber and fish resources)

21 USE OF WATER RESOURCES
- 21.1 Exploitation of water resources including water supply and distribution
- 21.2 Exploration and development of water resources

Remarks:

- General classification principles: Classification should be made according to the main purpose taking into account the technical nature as well as the policy purpose of an action or activity. Multi-purpose actions, activities and expenditure that address several CEA classes related to natural resource use should be divided by these classes.
- Classification of transversal activities: Transversal activities are research and development, administration and management as well as education, training and information. All transversal activities are regarded as related to natural resource management and consequently classified within the RM group of CEA.

Boundary cases between environmental protection, resource management and resource use activities

12. There are some activities for which the allocation to environmental protection or resource management and use activities is not straightforward and requires careful understanding of the main purpose.

13. Production of energy from renewable resources and energy saving. These activities can be carried out for the main purpose of reducing air pollution (if so they should be classified within environmental protection class 1) or for the main purpose of reducing the intake of energy resources (if so they should be classified within the resource management class 10). In order to establish the main purpose of such activities, specific features of the economy should be considered, as well as the main policy concern: e.g. for countries endowed with energy resources, the depletion of their own stocks could be the main concern, while the reduction of pollution could be the main purpose in countries where energy is obtained mostly from imports.

14. Accordingly, the production of energy from renewable resources and energy saving activities should be classified as resource management class 10, only if their main purpose is the reduction of the intake of energy resources; if the main purpose is the reduction of pollution, instead, the same activities should be classified as environmental protection class 1.

15. Recycling activities should be classified within environmental protection class 3 to the extent that they substitute waste management activities (collection, transport and disposal). Only the processing of waste and scrap aimed at transforming them into new raw materials and production of recycled goods represent resource management activities aiming at reducing the intake of raw materials. These activities are classified according to the natural resource concerned as follows:

    i. within resource management class 11 if they concern natural forest materials (e.g. recycled paper);
    ii. within resource management class 10 if they concern minerals (e.g. recycled glass);
    iii. within resource management class 13 if they concern non-cropped resources (non fossil organic materials) (e.g. recycled natural textile fibres);
    iv. within resource management class 10 if they concern fossil organic material (e.g. recycled plastic).

16. Waste incineration. According to the International Energy Agency (IEA) renewable energy includes the energy produced from burning wastes[16]. If the main purpose of waste incineration is energy production then it should be classified within resource management class 10; if the main purpose is waste disposal and treatment it should be classified within environmental protection classes 3.3 or 3.4

[16] OECD/IEA (2007), *Renewables in global energy supply*.