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# Environmental taxes – A statistical guide

2024 edition

MANUALS AND GUIDELINES

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## 2024 edition

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# Executive summary

The November 2013 edition of the manual titled "Environmental Taxes - 2013 edition" serves as a statistical guide focussing on the development of environmentally related tax statistics. This encompasses a comprehensive analysis of definitions, concepts, data sources, and estimation methods. A decade has passed since its publication, prompting the need for a minor revision of the manual. Notably, the main underlying methodology has remained unchanged.

The revision process in 2023 aimed to incorporate two key aspects. Firstly, Eurostat aimed to assimilate some experiences and insights gained through the collection of data from various countries over the years. Secondly, it intended to accommodate minor changes and amendments that had arisen since the manual's last update. Throughout this process, Eurostat actively received feedback from multiple stakeholders, enhancing the content with diverse perspectives and potential future considerations. Several of these inputs, while valuable, extended beyond the current approach and methodology.

To ensure that this additional material is accessible to readers, Chapter 6, titled 'Outlook and future developments', has been added to the manual. This additional section serves as a channel through which feedback and future possibilities are incorporated, thereby enhancing the overall utility of the manual.

# Preface

To address environmental problems, profound changes to existing production and consumption patterns are needed. These changes can involve substantial economic costs. The search for instruments capable of producing behavioural changes across all sectors at minimal cost makes policy-makers pay closer attention to market based instruments. Therefore, market based instruments for pollution control and natural resource management are an increasingly important part of environmental policy tools in the European Union (EU) and there is considerable interest in their use and effectiveness.

This statistical guide focuses on the development of statistics on environmentally related taxes (for convenience referred to simply as environmental taxes) as this is an area where basic data is generally readily available and comparable across countries. This guide is an update of Eurostat's 2013 Statistical guide on environmental taxes and includes definitions and concepts, data sources and estimation methods. The guidelines are based on a harmonised statistical framework originally developed in 1997 jointly by Eurostat, the European Commission's Directorate General Environment (DG ENV) and Directorate General Taxation and Customs Union (DG TAXUD), the Organisation of Economic Co-operation and Development (OECD) and the International Energy Agency (IEA). The update reflects the experience Eurostat gathered in collecting data from Member States and European Free Trade Association (EFTA) countries. One objective for the update of the manual is to improve the consistency and comparability of data on environmental taxes across Europe. This guide is also a basis for implementing Regulation (EU) No 691/2011 of the European Parliament and of the Council of 6 July 2011 on European environmental economic accounts and Regulation (EU) No 125/2022 of the European Parliament and of the Council of 19 November 2021. These Regulations require detailed data on environmental taxes to be submitted to Eurostat on an annual basis.

The guide provides a step-by-step procedure to compile data on environmental taxes and the process for data transmission, validation, and dissemination. Its purpose is to facilitate the production of harmonised data and to enable more rigorous cross-country comparison of data. The guide may serve national compilers as a compilation manual. Full implementation of the recommendations in this guide will help to ensure that data are compiled on a consistent basis in all Member States of the European Statistical System. Interested data users may also benefit from this publication as a source of background information and clarification.

Due to its clear focus on the practical implementation, the guide complements international references such as the United Nations System of Environmental-Economic Accounting Central Framework (SEEA CF 2012).

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Environmental statistics and accounts; sustainable development

# Acknowledgements

This manual has evolved through a process that commenced with Eurostat's 2001 statistical guide on environmental taxes. Special gratitude is owed to the Task Force on Environmental Transfers and the Working Group on Environmental Expenditure Statistics for their significant contributions to the 2013 edition of the statistical guide. Eurostat received valuable inputs from DG TAXUD, OECD, European Environment Agency (EEA) and Institut de Conseil et d'Etudes en Développement Durable (ICEDD, Belgium) who all played pivotal roles by providing their insights and perspectives. Their expertise significantly enhanced its content.

The collaborative spirit persisted for the 2024 Edition of the statistical guide, and special acknowledgement goes to the Members of the Working Group for Monetary Environmental Statistics and Accounts. Their expertise and contributions were instrumental in maintaining the high standards of this evolving manual, ensuring its continued relevance in the dynamic landscape of environmental taxation statistics.

# 1 Introduction

This handbook sets the background, definition, methodologies, procedures, and good practices to support the compilation of environmental tax statistics in EU Member States. While primarily targeting compilers of statistics, its content transcends this audience, offering fundamental principles and invaluable insights to all statistics practitioners. The handbook encompasses the entire statistics cycle, offering insights into data collection, compilation, processing, and publication at the European level. By following this handbook, Member States can harmonize their approaches, ensure data comparability, and contribute to the overall improvement of European statistics.

## 1.1. Context setting

The environment is affected by the existing production and consumption patterns. To address environmental problems, behavioural changes are needed some of which involve substantial economic costs and affecting labour, product, and capital markets.

Environmental policy aims to reach environmental and sustainable development goals. Policymakers use incentive-based tools to ensure that environmental solutions are found at least cost, for correcting externalities and/or for raising revenues for specific purposes.

Economic instruments for pollution control and natural resource management are thus an increasingly important part of environmental policy in EU and OECD countries.

The range of instruments includes, among others, environmental taxes, fees and charges, tradable permits, deposit-refund systems, and subsidies.

The EU has increasingly favoured such instruments because they provide a flexible and cost-effective means for reinforcing the polluter-pays principle, which is at the heart of EU environmental policy, and for reaching environmental policy objectives. Taxes can serve as a mechanism to generate government revenue, offering compensation to society for the detrimental effects caused by pollution. Additionally, they can act as a deterrent to prevent such damage from occurring initially. Other market-based instruments, although not primarily designed to generate revenue, can also effectively impose a cost on polluters, thereby instilling accountability for polluting activities.

The more intensive use of taxes, charges and other economic instruments for the environment is founded on the Treaty on the Functioning of the European Union (TFEU) ([1]) which states that EU policy on the environment shall be based on, among others, the principle that environmental damage should as a priority be rectified at source and that the polluter should pay and is reflected in several in EU strategies, among others, such as:

- EU 8th Environment Action Programme ([2]), which is based on, among others, the polluter pays principle where environmental damage should, as a priority, be rectified at source, and that the polluter should pay.
- A Sustainable Europe by 2030 and in the renewed EU Sustainable Development Strategy ([3]), which calls

([1]) https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A12016ME%2FTXT

([2]) Decision (EU) 2022/591 of the European Parliament and of the Council of 6 April 2022 on a General Union Environment Action Programme to 2030

([3]) https://commission.europa.eu/system/files/2019-02/rp_sustainable_europe_30-01_en_web.pdf

for the application for the "user pays" and "polluter pays" principles to prevent and correct environmental degradation, and to avoid passing the burden to taxpayers.

In this context, environmental taxes can serve to discourage behaviour that is potentially damaging for the environment and can provide incentives to lessen the burden on the environment and to preserve it by 'getting the prices right'. The economic rationale for their use comes from their ability to influence markets in a cost-effective way, unlike regulatory or administrative approaches.

Within the EU, the legal framework for the collection of information on environmental taxes is defined in Regulation (EU) No 691/2011 of the European Parliament and of the Council of 6 July 2011 and its amendments defined by Regulation (EU) No 538/2014 of the European Parliament and of the Council of 16 April 2014 and Regulation (EU) No 125/2022 of the European Parliament and of the Council of 19 November 2021.

Information about environmental taxes is important for areas such as environmental policy and environmental fiscal reform, as well as for analytical purposes. Environmental fiscal reform is a broad concept encompassing a range of fiscal policy measures (not only taxation but also other fiscal instruments like subsidies, charges, and incentives) aimed at promoting environmental sustainability and addressing environmental challenges.

Within environmental fiscal reform, a policy that has been of particular interest in recent years is green tax reform, which involves increasing taxes on the use of the environment and reducing taxes on other tax bases, in particular labour. Green tax reform is a subset of environmental fiscal reform, focusing specifically on the use of taxation to drive environmental improvements.

For green tax reform, tax revenue data, in the form of an aggregate overview of the structure and changes in structure of the taxation system, is important. This includes environmental tax revenue as a share of all revenue from taxes and social contributions, and the distribution of revenue among aggregate tax bases.

In the context of analysis for the purpose of statistical evaluation and recording, examples of analysis of environmental taxes are estimates of the environmental impact of a certain tax, such as the reduction in pollution resulting from introducing a new tax or from increasing the rates of an existing tax. For these purposes, physical data on the tax bases (e.g., emissions, waste, and energy products) and data on market prices of the products involved are needed. Detailed descriptions of the tax rules are also important for tax analysis. Estimating the effect of a tax for analytical purposes also requires information about pricing behaviour, i.e., how much of the tax is being passed on to buyers, and about the price elasticity of demand for the products involved. However, price elasticity and pricing behaviour are outside the scope of environmental tax statistics.

As such, data relating to environmental taxes can be used to analyse the revenue stream from said taxes to provide a relative measure of the importance of these taxes through the calculation of ratios relative to GDP or to the total revenue from all taxes and social contributions. This provides an understanding of a potential tax burden and supports the assessment whether or not the tax burden is shifting from other taxes to environmental taxes.

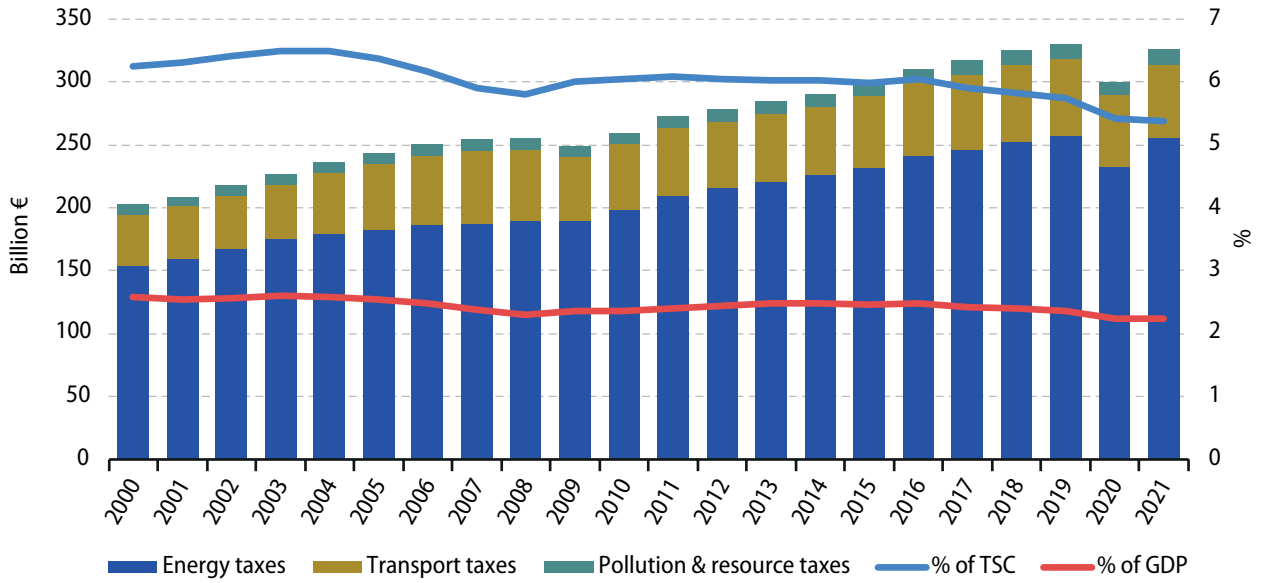
Environmental tax statistics are presented according to the four categories of environmental taxes, namely, energy, transport, pollution, and resource taxes.

The following figure presents the share in the EU between the four environmental tax categories in the period 2000-2021 in billions of euros and as a portion of gross domestic product (GDP) and total government revenue from taxes and social contributions (TSC) for the EU.

**FIGURE 1**

## EU environmental tax revenue by type and by total environmental taxes as share of TSC and GDP

**Environmental tax revenue by type and total environmental taxes as share of TSC and GDP,** EU 2000-2021, (billion EUR and % TSC and % GDP)




*Source:* Eurostat (online data codes: env_ac_tax, gov_10a_taxag)

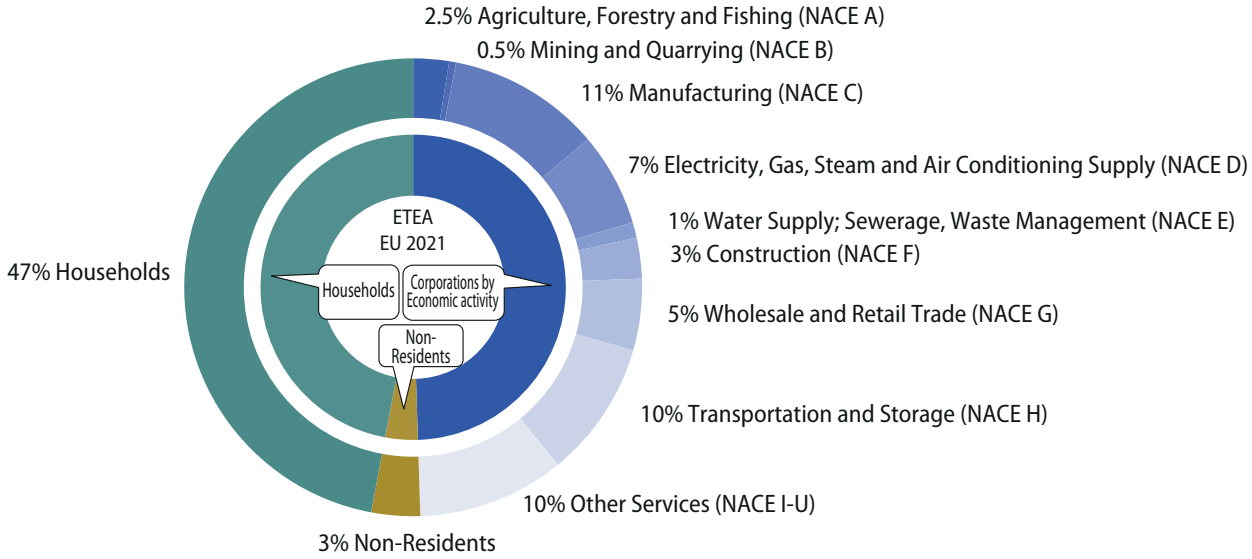
EU environmental tax revenue amounted to €330 billion in 2021 compared with the €301 billion recorded in 2020. The revenue of €330 billion corresponds to 2.2% of EU GDP and 5.3% of EU TSC.

Additionally, data can be presented by the economic activity paying the taxes according to the statistical classification of economic activities in the European Community (NACE), plus resident households as consumers and non-residents.

Such a more detailed breakdown of the EU environmental tax revenue for 2021 is shown in Figure 2.

**FIGURE 2**

## Detailed breakdown for the environmental tax revenue in the EU 2021 by payer




## 1.2. Structure of the handbook

Chapter 1 commences with an introduction that outlines the context for environmental tax statistics and sets the stage for the subsequent content of the handbook.

Moving on, Chapter 2 presents the foundations of environmental tax statistics by offering in-depth insights into various key aspects. This includes delving into definitions, tax categories, and borderline cases, ensuring a solid conceptual foundation.

The handbook then in Chapter 3 navigates through classification systems that are pivotal to environmental tax statistics. It explores the NACE classification system and elaborates on its role. Additionally, it examines the classification of environmental protection activities (CEPA), the classification of resources management activities (CReMA), and the classification of environmental purposes (CEP), shedding light on their importance in this context.

Central to the handbook is the framework for data collection and reporting, which is provided in Chapter 4. This section is the heart of the handbook, covering crucial steps in detail. It outlines the fundamental approach to data collection, elaborates on establishing a comprehensive list of environmental taxes, and identifies reliable data sources. Moreover, it illustrates the process of allocating environmental tax revenue to appropriate tax categories and economic activities. The section also addresses the intricate matter of taxes paid by non-resident entities.

Chapter 5 focuses on presenting environmental tax revenue data through tables and indicators, enabling clear and informed visualization. It ensures the effective communication of data by offering insights into the presentation and interpretation of data.

Finally, Chapter 6 provides future developments of the handbook that have not been incorporated during the current update. It lists these elements and defines the reasoning why they have not been included in this version of the handbook.

# 2

# Foundations of environmental tax statistics

This chapter presents the concepts, definitions, and categories used for environmental tax statistics. It also presents how specific borderline cases are to be treated.

Environmental tax statistics are part of environmental economic accounts which constitute satellite accounts to the national accounts. The national accounts are the general statistical framework for measuring the economy from which indicators such as GDP are derived. Satellite accounts complement this framework with information on selected areas of specific concern, such as the environmental accounts (European System of Accounts (ESA 2010), paragraphs 1.40 – 1.49).

In the international guidelines on environmental accounts (System of Environmental-Economic Accounting Central Framework (SEEA CF)) an accounting framework is presented related to the environment and its interactions with the economy. The SEEA CF enables an examination of how the environment influences the economy and how the economy affects the environment, facilitating an evaluation of the reciprocal relationship between the two. As such, within the SEEA CF, the role of taxes of environmental activity accounts and related flows (Chapter IV of SEEA CF) is to capture the economic interactions between environmental protection and economic activities.

An important feature of satellite accounts is that the basic concepts and classifications of the standard national accounts framework (ESA 2010) are retained. Using the concepts and classifications employed in the central framework enables the link to be made and ensures a consistent extended framework is drawn up.

## 2.1. Legal framework

At European level, statistics on environmental taxes use as a basis the legislation in the area of environmental accounts and in the area of national accounts.

Regulation (EU) No 691/2011 of the European Parliament and of the Council of 6 July 2011 on European environmental economic accounts provides a framework for the development of various types of environmental accounts (also referred to as modules). It was amended by Regulation (EU) No 538/2014 of the European Parliament and of the Council of 16 April 2014. The Regulation covers six modules:

1. Air emissions accounts, as set out in Annex I.
2. Environmentally related taxes by economic activity, as set out in Annex II.
3. Economy-wide material flow accounts, as set out in Annex III.
4. Environmental protection expenditure accounts, as out in Annex IV.
5. Environmental goods and services sector accounts, as set out in Annex V.
6. Physical energy flow accounts, as set out in Annex VI.

Regulation (EU) No 125/2022 of the European Parliament and of the Council of 19 November 2021 on amending Annexes I to V to Regulation (EU) No 691/2011 of the European Parliament and of the Council on European environmental economic accounts additionally requires Member States to provide a breakdown of taxes recorded for government revenue arising from the EU Emissions Trading System (EU ETS) and other CO2 taxes.

The delivery of national accounts data to Eurostat is regulated in the national accounts transmission programme ([4]). The transmission programme includes table 9 — Detailed tax and social contribution receipts by type of tax and social contribution and receiving sub-sector. In addition, the full detail of the national classification of taxes and social contributions, with corresponding amounts and ESA codes, must be provided (the so-called national tax list). In the national tax list, the taxes are also classified by economic function codes. The main functions are consumption, labour, and capital. In addition to these main groups ([5]), also environmental taxes are identified in the national tax lists.

## 2.2. Definitions, categories, and borderline cases

### 2.2.1. Statistical unit for environmental taxes

The statistical unit refers to the specific entity for which the required statistics are compiled. National accounts aim to capture economic activity within the domestic territory. They combine data from a host of base statistics, and thus they have no common sampling reference frame. Considering that Regulation (EU) No 691/2011 does not explicitly mention the relevant statistical unit for environmental taxes, the approach defined in the European System of National and Regional Accounts (ESA 2010) ([6]) regarding the relevant statistical unit is followed.

The elementary building blocks of ESA 2010 statistics are statistical units and their groupings. ESA 2010, defines two types of statistical units relevant for national accounts, namely, institutional units and local kind-of-activity units, which can be described as follows:

- Institutional unit – a unit with decision-making autonomy in respect of its principal function and which keeps a complete set of accounts, e.g., companies or cooperatives, partnerships, public enterprises, or non-profit institutions recognized as independent legal entities.
- Local kind-of-activity unit (local KAU) – The local kind-of-activity unit (local KAU) is the part of a KAU which corresponds to a local unit. The KAU groups all the parts of an enterprise contributing to the performance of an activity at class level and corresponds to one or more operational subdivisions of the enterprise. The enterprise's information system must be capable of indicating or calculating for each KAU at least the value of production, intermediate consumption, manpower costs, the operating surplus and employment and gross fixed capital formation.

### 2.2.2. Time of recording

In line with ESA 2010, flows, monetary as well as non-monetary and intra-unit as well as flows between unit, shall be recorded on an accrual basis; that is, when economic value is created, transformed or extinguished, or when claims and obligations arise, are transformed or are cancelled. It is different from cash accounting, which records cash flows at the time payments occur.

As such, in accordance with accrual recording, environmental taxes should be recorded when the activities, transactions or other events occur which create the liability to pay tax — in other words when the taxable events occur — and not when the payments are due to be made or are actually made.

### 2.2.3. Definition of environmental taxes

Most payments to government are taxes, which can be labelled in different ways. Care must therefore be taken to ensure a clear understanding of their underlying basis. In line with SEEA CF, the following definition of a tax is used:

**Taxes are compulsory, unrequited payments, in cash or in kind, made by institutional units to government units.**

In this context, the EU statistical framework uses the following definition of an environmental tax, in line with Regulation (EU) No 691/2011 and SEEA CF:

**A tax whose tax base is a physical unit (or a proxy of a physical unit) of something that has a proven, specific**

([4]) Annex B of Regulation (EU) No 549/2013 of the European Parliament and of the Council of 21 May 2013 on the European system of national and regional accounts in the European Union.

([5]) The current functions treat environmental taxes as a mutually exclusive category within economic functions. This is an avenue for potential improvement as environmental functions can cut across different economic functions.

([6]) https://ec.europa.eu/eurostat/documents/3859598/5925693/KS-02-13-269-EN.PDF/44cd9d01-bc64-40e5-bd40-d17df0c69334

**negative impact on the environment, and which is identified in ESA 95 as a tax. ([7])**

ESA 2010 succeeded the previous version, ESA 95, and it serves as the standard for national accounts in the EU. It is a set of harmonised accounting rules and guidelines established by the EU to facilitate the systematic and comprehensive collection, compilation, and presentation of economic statistics for its Member States. As such, the ESA 2010 framework provides a common methodology for the measurement of economic activities and transactions across EU countries, ensuring consistency and comparability of data. From the perspective of environmental tax statistics there are no substantial differences between ESA 95 and the new ESA 2010.

The definition puts emphasis on the **effect** of a given tax in terms of its impact on the cost of activities and the prices of products that have a negative effect on the environment. The environmental effect of a tax comes primarily through the impact it has on the relative prices of products and on the level of activities, in combination with the relevant price elasticities.

Furthermore, the definition puts emphasis on the **tax base**. An environmental tax is a tax on a tax base which has a specific negative impact on the environment. The tax base was seen as the only objective basis for identifying environmental taxes for the purpose of international comparisons. Other possible criteria, such as the purpose stated by the tax legislator, the name of the tax or the earmarking of the revenue for environmental purposes are less suitable and more difficult to use in practice.

Many taxes are introduced with several purposes in mind, e.g., both to influence behaviour by making a product more expensive to use and to generate revenue. Since the environmental impact of the tax comes mainly from its effect on relative prices, a tax on e.g., petrol introduced for fiscal reasons will have the same effect as one that is introduced with the stated purpose of reducing emissions.

To identify environmental taxes, a **list of tax bases** was established. All taxes levied on these tax bases are considered environmental taxes. In some cases, the tax base is the measured or estimated amount of emissions of a polluting substance, such as NOx. However, it is often difficult and expensive to measure emissions directly, so many taxes are based on proxies for emissions, for example the use of fuel oil.

The definition refers to the tax definition of the **national accounts**. This is done to ensure international comparability and reflects that environmental tax statistics are a satellite account to the national accounts.

The term 'environmental taxes' can be interpreted as referring to taxes with an environmental, rather than a fiscal, motivation. Since motivation is not part of the definition used for environmental tax statistics, it can be argued that the term 'environmentally related taxes' is more appropriate. This is the term used in Regulation (EU) No 691/2011 and is preferred e.g., by the OECD. As the more convenient term 'environmental taxes' is in common use, it is used in these guidelines. This term is also used in the United Nations System of Environmental-Economic Accounting (SEEA 2012) which was adopted as an international statistical standard in 2012.

Experience over the years has shown that several interpretations of the concept of environmental tax may exist. It is useful for compilers to be aware of these interpretations which are described below.

## NATIONAL ACCOUNTS TAX DEFINITION VERSUS LEGAL TAX DEFINITION

The environmental tax statistics framework uses the tax definition of the national accounts as a reference. The national accounts definition improves international comparability of the statistics, and allows integration of the tax data with the national accounts and with systems of integrated environmental and economic accounting.

The legal definition of taxes may differ across countries, and may be different from the definition used in the national accounts. In many countries the constitution or other major law defines the kind of taxes and charges a government can levy.

The legal definition can be relevant for users as it has an influence on how policy makers can use taxes as instruments for environmental protection. For national purposes countries may choose to describe environmental taxes both from the legal perspective and the national accounts perspective. For international comparability purposes and for reporting under Regulation (EU) No 691/2011, the environmental tax statistics must be based on the national accounts tax definition.

([7]) The current statistical guide continues to make reference to ESA 95, in line with Regulation (EU) No 691/2011.

## PIGOVIAN TAXES AND RAMSEY TAXES

The term 'environmental taxes' is sometimes interpreted to mean Pigovian taxes. ([8]) A Pigovian tax is a tax levied on a market activity that generates negative externalities. The environmental economic theory describes the concept of externality as a cost or benefit, not transmitted through prices. The benefit corresponds to a positive externality and the cost corresponds to a negative externality. Negative externalities or 'social costs' are related to the environmental consequences of production and consumption.

In the presence of negative externalities, the social cost of a market activity is not covered by the private cost of the activity. In such a case, the market outcome is not efficient and may lead to over-consumption of the product. A Pigovian tax is a tax levied on the negative externality at a tax rate that is equal to the marginal damage costs and is considered to correct the market outcome back to efficiency. In practice, the application of Pigovian tax theory faces the difficulty of calculating what level of tax will counterbalance the negative externality i.e., what tax rate equals the marginal social costs. Furthermore, Pigovian taxes should be levied directly on the negative externality or on tax bases that are very close proxies of the social costs such as emissions.

Given the difficulties with estimating Pigovian tax rates, environmental taxes as defined in this guide include more than the Pigovian taxes as described in economic theory. As an example, the rate of a tax on energy products may be set with fiscal motives in mind and may be higher than the marginal damage from the production and use of the energy products.

In advanced research ([9]) it is shown that for polluting goods the tax rate should not only vary according to the social costs but also according to the elasticity of demand. According to the rule of Ramsey ([10]) the tax rate of an optimal fiscal tax is set inversely proportional to the price elasticity of demand for the tax base, i.e., the more inelastic the demand, the higher the tax rate. This minimises the so-called 'dead-weight costs' of taxes, i.e., the distortion of economic activities by taxation. The relative weight that should be given to the Pigovian and Ramsey components is determined by the marginal costs of public funds.

It may be useful to alert users of environmental tax statistics that they cannot assume that the actually observed environmental tax rates and tax revenues correspond to these theoretical models.

## TAXES WHOSE REVENUES ARE EARMARKED OR HYPOTHECATED FOR ENVIRONMENTAL PURPOSES

Another possible interpretation of the term 'environmental taxes' is that these are taxes whose revenue is earmarked for environmental purposes. The hypothecation or ear marking of a tax is the dedication of the revenue from a specific tax for a particular expenditure purpose. Taxes earmarked for environmental purposes ([11]) are taxes whose revenues must be used for environmental purposes, usually via fiscal bodies, agencies, etc. which collect the tax revenue and provide specific transfers to other units or directly use the funds for financing environmental activities. Data about earmarked taxes can be used for example for analysing the funding mechanisms of environmental activities.

The definition of taxes earmarked for environmental purposes focuses only on the use of the tax revenue and is different from the definition of environmental taxes based on the tax base. Therefore, some of these earmarked taxes may be levied on tax bases other than those used in the definition of environmental taxes. However, in practice it is often environmental taxes whose revenue is earmarked for environmental purposes so that the earmarked taxes de facto represent a sub-set of environmental taxes.

An example of an earmarked tax which satisfies the definition of environmental taxes is the Dutch water pollution tax, which is used to finance e.g., activities of sanitation and purification of wastewater.

In some cases, rerouting is necessary to correctly earmark or hypothecate the revenue for environmental purposes. This allows to bring out the underlying economic relationships more clearly. Further details on rerouting are provided in the Manual on Government Deficit and Debt (MGDD) – Implementation of ESA 2010 – 2022 edition ([12]).

([8]) After Arthur Cecil Pigou, a British economist. Pigou, A. C. The Economics of Welfare, 1920.

([9]) See e.g., A. Bruvoll 2009: On the measurement of environmental taxes, discussion papers 599, Statistics Norway research department.

([10]) F. Ramsey 1927: A contribution to the theory of taxation.

([11]) The SERIEE manual (European Commission, 1994) defines a category of taxes called 'specific taxes' to mean these earmarked taxes. These are taxes that help finance environmental protection expenditure.

([12]) https://ec.europa.eu/eurostat/documents/3859598/16029761/KS-GQ-23-002-EN-N.pdf/77a75b07-61c3-7d34-5243-70d09bc00e44?version=3.0&t=1677163672121

## 2.2.4. Tax bases

To supplement the definition of environmental taxes given in section 2.2.3, a list of environmentally relevant tax bases was agreed in 1997 by Eurostat, the European Commission's Directorate General Environment and Directorate General Taxation and Customs Union, the OECD and the IEA. This list has been slightly updated in 2011 and 2012 with the help of a Eurostat task force based on the practical experience since 2001. The list of tax bases is presented in Table 1. The tax bases are grouped by four main categories (energy, transport, pollution, and resources). The aim of this list is to help compilers in their analysis of individual taxes and to provide guidance on which taxes to include in the framework of environmental taxes.

The list of tax bases is the only objective basis for identifying environmental taxes for the purpose of international comparisons. All taxes levied on tax bases as described in Table 1 are considered to be environmental taxes.

Other possible criteria, such as the name of the tax, the purpose stated by the tax legislator or the earmarking of the revenue for environmental purposes are not a good basis for defining environmental taxes. However, such supplementary information may still provide useful hints for determining e.g., whether a newly introduced tax could be an environmental tax or not. This supplementary information may also be useful for classifying environmental taxes into different categories (e.g., in deciding whether a tax is a pollution tax or a transport tax).

**TABLE 1**

### List of environmental tax bases

**Energy (including fuel for transport)**

- Energy products for transport purposes
  - Unleaded petrol
  - Leaded petrol
  - Diesel
  - Other energy products for transport purposes (e.g., LNG, LPG, natural gas, kerosene, or fuel oil)
- Energy products for stationary purposes
  - Light fuel oil
  - Heavy fuel oil
  - Natural gas
  - Coal
  - Coke
  - Biofuels
  - Electricity consumption and production
  - District heat consumption and production
  - Other energy products for stationary use
- Greenhouse gases
  - carbon content of fuels
  - emissions of greenhouse gases (including proceeds from emission permits recorded as taxes in the national accounts)

**Transport (excluding fuel for transport)**

- Motor vehicles import or sale (one off taxes)
- Registration or use of motor vehicles, recurrent (e.g., yearly taxes)
- Road use (e.g., motorway taxes)
- Congestion charges and city tolls (if taxes in national accounts)
- Other means of transport (ships, airplanes, railways, etc.)
- Transportation infrastructure (ports, harbours and airports, road, rail, and pipeline networks, etc.)
- Flights and flight tickets
- Vehicle insurance (excludes general insurance taxes)

**Pollution**

- Measured or estimated emissions to air
  - Measured or estimated $NO_x$ emissions
  - Measured or estimated $SO_x$ emissions
  - Measures or estimated particulate matter (PM) emissions
  - Measured or estimated volatile organic compounds (VOC) emissions
  - Other measured or estimated emissions to air (excluding energy related $CO_2$)
- Ozone depleting substances (e.g., CFCs or halons)
- Measured or estimated effluents to water
  - Measured or estimated effluents of oxydisable matter (BOD, COD)
  - Other measured or estimated effluents to water
  - Effluent collection and treatment, fixed annual taxes
- Non-point sources of water pollution
  - Pesticides (based on e.g., chemical content, price or volume) and synthetic pesticides
  - Artificial fertilisers (based on e.g., phosphorus or nitrogen content or price)
  - Manure
- Solid waste management
  - Collection, treatment or disposal

  - Individual products (e.g., packaging, beverage containers, plastic bags, batteries, tyres, lubricants, motor oil, hazardous waste)
- Noise (e.g., aircraft take-off and landings)
- Other pollution (paint and solvents, biomedical and personal care products, cleaning products, radiation, etc.)

**Resources**

- Fresh water abstraction
- Harvesting of biological resources (e.g., timber, hunted and fished species)
- Extraction of raw materials (e.g., minerals)
- Landscape changes and cutting of trees
- Semi natural and natural land conversion to (intensive) agriculture and forestry, urban and infrastructure development, mining, etc.

## 2.2.5. Main categories of environmental taxes and borderline cases

For analytical purposes, in line with Regulation (EU) No 691/2011, the environmental taxes are classified into four main categories which correspond to the four categories of tax bases as shown in Table 1:

- Energy taxes (including fuel for transport)
- Transport taxes (excluding fuel for transport)
- Pollution taxes
- Resource taxes

Furthermore, in line with Regulation (EU) No 125/2022 amending Annexes I to V to Regulation (EU) No 691/2011, Member States are required to provide a breakdown of environmental taxes for:

- EU Emissions Trading System (EU ETS) $CO_2$ taxes
- Other $CO_2$ taxes

While the term commonly used is still '$CO_2$ taxes', in principle, it already mostly encompasses all greenhouse gas (GHG) emissions expressed in $CO_2$ equivalents ($CO_2$ eq). This becomes evident when examining the collection from e.g., EU ETS revenues from auctioning of permits as in the associated regulations it clearly refers to a comprehensive list of GHGs, which includes $CO_2$, methane ($CH_4$), nitrous oxide ($N_2O$), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride ($SF_6$).

In most countries the energy and transport categories are by far the most important in terms of revenue. This section provides further detail on the kinds of tax bases and taxes that should be included under the different categories. Some taxes constitute borderline cases and require a case-by-case judgement within the statistical office whether they are environmental taxes and under which tax category they belong. The case-by-case judgement should be based on the analysis of the tax base(s) and tax rules.

### ENERGY TAXES (INCLUDING FUEL FOR TRANSPORT)

This category includes taxes on energy production and 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 biofuels and on any other form of energy from renewable sources are included. ([13]) Taxes on stocks of energy products are also included.

### TRANSPORT TAXES (EXCLUDING FUEL FOR TRANSPORT)

This category mainly includes taxes related to the ownership and use of motor vehicles. Taxes on other transport equipment (e.g., planes, ships, or railway stocks), and related transport services (e.g., duties on charter or scheduled flights) are also included here, when they conform to the general definition of environmental taxes. 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.

All taxes on means of transport should be included, even taxes on means of transport that are considered to be relatively more environmentally friendly such as railway rolling stock and public transport in general. Also, taxes on electric cars should be included. Taxes on vehicle insurance should also be included provided they are specific taxes on the insurance of vehicles and not general insurance taxes levied on all kinds of insurance contracts.

Taxes on petrol, diesel and other transport fuels are included under energy taxes.

In a number of countries taxes on the specific $CO_2$ emissions of vehicles have been introduced which are one-off registration or import taxes or annual vehicle taxes. These taxes are not related to the actual use of the vehicles or to the actual emissions generated. The tax base is a technical property of the vehicle such as the average $CO_2$ emissions per 100 km or the average fuel consumption per 100 km,

([13]) For national purposes, countries may wish to separately identify the revenues from taxing energy from renewable sources where this is feasible.

often combined with other similar technical properties such as vehicle weight or engine power. These taxes are to be considered as transport taxes and not as energy taxes.

Some cities have introduced charges for access to the city centre (congestion charges or city tolls). The charges seem to differ considerably in their characteristics across countries but also across different cities in individual countries. These charges are treated differently in the national accounts of the countries having such charges (e.g., some such charges are treated as fees paid for a service, others as taxes). If a city charge is treated as a tax in the national accounts, then it should be included as a transport tax.

### POLLUTION TAXES

This category includes taxes on measured or estimated emissions to air and water, management of solid waste and noise.

Taxes on lubricating oils may require specific analysis. Lubricating oils are not used for energetic purposes and are probably best placed under pollution taxes. Major environmental impacts can include soil or water pollution if lubricating oil is spilled. However, where lubricating oils are included in the mineral oil tax it may not be possible to identify the tax revenue related to lubricating oils.

### RESOURCE TAXES

This category includes taxes linked to the extraction or to the use of natural resources, such as water, forests, wild flora and fauna, etc., as these activities deplete natural resources. All taxes designed to capture the resource rent from the extraction of natural resources should be excluded (for detail see section 2.2.6.

Most taxes on land are property taxes and belong to the ESA category D.51 (taxes on income). This guide recommends excluding all taxes on land from scope (see section 2.2.6 for detail). However, in some countries there are specific taxes to be paid for the conversion of landscapes (e.g., deforestation) which should be included as they are increasingly used as an environmental policy tool.

### ETS $CO_2$ AND OTHER $CO_2$ TAXES

These categories include government tax revenue recorded in the European System of Accounts in relation to their participation in the EU ETS (ETS $CO_2$ taxes) and other environmentally related taxes which have been included in total energy, transport, pollution, or resource taxes and are levied on carbon content of fuels (other $CO_2$ taxes).

However, as previously stated, the collection of revenues through the auctioning of permits within the EU ETS pertains to more than just $CO_2$ allowances. It encompasses a more comprehensive list of GHGs ($CO_2$, $CH_4$, $N_2O$, HFCs, PFCs, and $SF_6$).

ETS for $CO_2$ and other $CO_2$ tax bases are tools that aim to internalize the environmental costs of carbon emissions and incentivize emission reductions. ETS $CO_2$ establishes a market for trading emission allowances to encourage cost-effective reductions. $CO_2$ taxes directly price carbon emissions, promoting cleaner practices. $CO_2$ tax bases include emissions, fuel consumption, energy content, carbon intensity, and value. As such, the majority of $CO_2$ taxes are classified as energy taxes, with certain specific cases classified under other environmental tax categories. Included $CO_2$ taxes comprise carbon taxes on fuels, sector-specific levies, carbon-embedded goods taxes, aviation and shipping charges, border adjustments, and carbon offsets.

## 2.2.6. Tax revenue from emission permits under cap-and-trade schemes

Government revenues from the auctioning of emissions permits under cap-and-trade schemes are treated as tax receipts and are shown in the national accounts. In the national accounts, the payments for emission permits, issued by governments under cap-and-trade schemes, should be recorded at the time the emissions occur as other taxes on production (D.29), on an accrual basis. The timing difference between the payments received by government for the permits and the time the emission occurs gives rise to a financial liability (accounts payable) for government and a financial asset (accounts receivable) for the holder.

In other words, the treatment recommended foresees recording the issuance against payment of an emission permit as a pre-payment of tax at the time of issue, leading to a financial liability of government. This liability is then settled against the tax payment which is recorded when the permit becomes due to be handed back (surrendered) because the emission covered by the permit occurred. The time of recording of the tax payment is the time of the emission covered by the permit.

For purposes of environmental tax statistics, payments for emission permits that are recorded as taxes on production (D.29) in the national accounts are to be included as is defined in the Government Finance Statistics Manual 2014 (GFSM 2014) paragraph A4.49.

In the EU, an emissions trading system (the EU ETS) ([14]) was established, which covers the EU Member States and the EEA-EFTA states Iceland, Liechtenstein, and Norway. Launched in 2005, the EU ETS is now in its fourth phase, running from 2021 to 2030. The EU ETS is a cap-and-trade scheme that includes more than 11 000 power stations and industrial plants as well as airlines and covers approximately 40 % of the EU's greenhouse gas emissions.

The EU ETS covers emissions of $CO_2$ from power plants, a wide range of energy-intensive industry sectors and commercial airlines. Nitrous oxide emissions from the production of certain acids and emissions of perfluorocarbons from aluminium production are also included.

For an international or EU scheme, the amount of permits issued by one country may differ from the amount surrendered to that country, due to international trading of permits. In theory, in this case, taxes on production (D.29) paid by non-residents to the national government or paid by residents to foreign governments would have to be recorded. For simplicity, the international guidance ([15]) allows ignoring this difference when the amount issued by a government is lower than the amount of permits surrendered to this government — this corresponds to the case where resident units pay taxes to foreign governments for the permits. Conversely, when the amount issued is higher than the amount surrendered, the difference should be written off. This approach will potentially result in some of the payments for permits not being recorded as tax payments.

The implementation of the international guidance in the EU is described in the Manual on Government Deficit and Debt (MGDD) – Implementation of ESA 2010 – 2022 edition ([16]). In the absence of precise information on individual allowances (including their original sale price which may vary from one auction to another), the MGDD provides methods to determine the level of tax revenue to be recorded in any particular year.

## 2.2.7. Taxes that are excluded from environmental tax statistics

The following taxes should be excluded from environmental tax statistics for the reasons discussed in this section:

- Value added taxes
- Land taxes (excluding taxes on land conversion)
- Payments to the government on the extraction of sub-soil assets that should be treated as rents
- Alcohol, tobacco and similar consumption taxes, and taxes on income and on labour

### VALUE ADDED TAX

Value added type taxes (VAT) are excluded from the definition of environmental taxes. This is mainly because of the special characteristics of this type of tax. VAT is a tax levied on all products (with few exceptions), and it is deductible for many producers, but not for households. Because of this, it does not influence relative prices in the same way that other taxes on environmental tax bases do.

Another reason for excluding VAT from the definition is that revenue data for VAT is often not available by product. Environmentally related revenues would have to be estimated using information on VAT rates combined with estimates of the total sales of the products and taking into account exemptions and deductibility of the VAT.

However, the SEEA 2012 ([17]) proposes that the VAT which is levied on an environmental tax could be taken into account. An example is VAT levied on transport fuels to the extent that the VAT is on the mineral oil tax. The part of the VAT charged on the net price before mineral oil tax of the fuel is not to be included also according to the SEEA 2012.

In principle, many environmental taxes could be subject to VAT, e.g., mineral oil taxes, taxes on vehicle sales or taxes on specific harmful products (batteries, pesticides, packaging materials etc.). Only the part of this VAT on environmental taxes that cannot be deducted by the tax payer would be of relevance. Since it would be both difficult and labour intensive to estimate this VAT revenue and since the non-deductible part would be rather small compared to total revenue from environmental taxes, this statistical guide recommends that for international comparison purposes all VAT should be excluded, including this special case of VAT levied on environmental taxes.

For national purposes, countries can include some special components of VAT, e.g., the VAT on environmental taxes described above or other special VAT. For example, in Austria and Spain a special high VAT rate was levied on car sales which had to be abolished in the early 1990s due to

([14]) http://ec.europa.eu/clima/policies/ets/index_en.htm

([15]) http://unstats.un.org/unsd/nationalaccount/sna/nn32-33-En.pdf

([16]) https://ec.europa.eu/eurostat/documents/3859598/16029761/KS-GQ-23-002-EN-N.pdf/77a75b07-61c3-7d34-5243-70d09bc00e44?version=3.0&t=1677163672121

([17]) See https://seea.un.org/content/seea-central-frame

EU tax harmonisation. The special high VAT was replaced by environmental taxes. Including an estimate of this special VAT revenue in national publications could improve the consistency of the time series. For reporting under Regulation (EU) No 691/2011 all VAT should be excluded.

## LAND TAXES (EXCLUDING TAXES ON LAND CONVERSION)

Land taxes can constitute a borderline case. In many countries taxes on land are considered property taxes and the tax is levied on the value of the land or of the real estate. These are not environmental taxes. In some cases, there can be land taxes specifically levied on the square meters of soil sealed, or taxes to limit urban sprawl, for example. For such taxes it is less clear whether they should be treated as environmental taxes or not.

Often land taxes are local taxes that generate little revenue and where information on the specific tax base used by each local government is not available. To ensure international comparability, this guide recommends that land taxes should be excluded from environmental taxes. Where a country considers a land tax as an environmental tax because it is levied on uses of land with a specific negative impact on the environment, it can be classified as a resource or pollution tax for national purposes.

## PAYMENTS TO THE GOVERNMENT ON THE EXTRACTION OF SUB-SOIL ASSETS THAT SHOULD BE TREATED AS RENTS

According to the ESA, taxes are compulsory, unrequited payments levied by general government. Rents are not taxes, but a part of a wider category called property income. Rents on sub-soil assets are the royalties that accrue to the owners of deposits of minerals or fossil fuels who grant leases to other institutional units permitting them to explore or extract such deposits.

In many countries, government is the owner of sub-soil assets. Government being at the same time the owner of the sub-soil assets and the tax legislator it is common that governments collect the resource rent in the form of taxes which are designed to capture the resource rent. Such payments by extractors should be shown as property income (D.45) of government in the national accounts even if these payments are legally described as taxes and treated as taxes in a government's own accounts (see SNA 2008, paragraph A3.76).

The resource rent can be defined as the value of output less all extraction costs, including a normal return to fixed capital, and represents a kind of 'pure profit' from extraction.

In principle all taxes designed to capture the resource rent should be classified as property income (D.45) rather than as taxes in the national accounts. To the extent that such taxes still remain in the national tax list, they should not be considered as environmental taxes when it is clear that these are taxes to capture the resource rent. By far the most important cases in monetary terms will be related to oil and gas extraction. This guide recommends that taxes on oil and gas extraction should be excluded from environmental tax statistics. Excluding taxes on oil and gas extraction makes environmental tax statistics more useful for cross-country analysis:

- the revenue from these taxes is important in very few EU countries so that the comparison of environmental tax revenues across countries (e.g., for benchmarking for fiscal reform purposes) would be distorted by including the large amounts that come from oil and gas extraction;
- the systems to capture the resource rent differ across countries (e.g., due to government ownership in extraction companies) so that the amounts of taxes from oil and gas extraction are not comparable across countries.

It should be noted that the exclusion of taxes on oil and gas extraction does not mean to exclude all taxes on the oil and gas extraction industry from the scope of environmental taxes. For example, taxes paid on vehicles or energy used by the oil and gas extraction industry or taxes on waste or emissions of this industry should of course not be excluded.

## ALCOHOL, TOBACCO AND SIMILAR CONSUMPTION TAXES, TAXES ON INCOME AND ON LABOUR

Taxes on products or activities that are not considered to be specifically negative for the environment (compared to other similar products) should not be included in environmental tax statistics. This concerns in particular taxes on alcoholic beverages and on tobacco products and similar taxes that exist in some countries (e.g., taxes on coffee or taxes on pet animals).

Following from the considerations already presented for VAT, a tax should be specific to be counted as environmental. Therefore, general taxes on income or labour should be excluded.

### 2.2.8. Proxies of a physical unit

How to decide in practice whether a tax (e.g., a newly introduced tax) is an environmental tax when its tax base is not (yet) included in the list of environmental tax bases?

The main consideration should be the economic power of the tax to increase the costs of a polluting activity and thus discourage it. Therefore, taxes on the use of roads or taxes on the electricity grid would be included on the grounds that such taxes increase the costs of using vehicles or electricity and thus help reduce the use of energy and of associated pollution.

More generally, a tax that can be expected to increase (directly or indirectly) the cost of a product or activity deemed to be harmful to the environment relative to other (less harmful) activities or products should be considered to be environmental.

This logic would suggest that the following taxes should be booked as environmental taxes:

1. taxes on quantity of output or sale price of environmentally harmful products;
2. taxes that increase specifically the variable costs of producing these environmentally harmful products;
3. taxes that increase the fixed costs of inputs used specifically for an environmentally harmful activity (e.g., taxes on the electricity transmission grid or on assets used for producing energy).

In other words, if a product is identified in the list of tax bases (for example, electricity) then all taxes that increase the price of that product directly (e.g. taxes on electricity consumption) or indirectly (e.g. taxes on inputs for electricity production such as nuclear fuel or taxes on fixed assets used to produce or distribute electricity) should be considered environmental taxes provided that these taxes are specific to the activity concerned. General labour taxes, for example, could not be considered specific to environmentally harmful activities as they affect a large number of activities.

Profit taxes are a specific issue. Clearly, the general profit taxes that apply to all kinds of activities in an economy are out of scope. But should profit taxes that specifically target environmentally harmful activities be included as environmental taxes? Examples could be special profit taxes on electricity producers, on nuclear operators or on oil and gas extraction companies.

For any such specific profit taxes shown in the national accounts, one could find arguments for and against considering them as environmental. Under the simplifying assumptions of basic tax incidence theory, profit taxes may be deemed not to influence output at all, which would be an argument for not considering them environmental. Furthermore, such special profit taxes are often used to capture monopoly profits or resource rent (and in the latter case should not be treated as taxes in the national accounts) and will not influence sales prices. On the other hand, it could be argued that such taxes can increase the cost of capital for the companies concerned, which under real-life conditions may well have some indirect effect on sales prices. And in the long run, profit taxes might influence investment decisions and, in the end, indirectly also output. This guide recommends excluding all profit taxes from environmental tax statistics.

In conclusion, in order to decide about the classification of newly introduced taxes whose tax base is not currently included in the list, 'a proxy of a physical unit' should be interpreted as including not only the quantity but also the price of any tax base included in the list, as well as any tax specifically levied on inputs of the activities that produce this tax base. These inputs comprise intermediate inputs as well as assets needed for production. Profit taxes should be excluded due to their distant and uncertain effect on the volume or price of the tax base listed.

A recent example is newly introduced taxes in some countries on nuclear fuels or on nuclear power stations, or on the profit of nuclear power operators. Another example is a tax on electric pylons. Following the guidance, as electricity is included in the list of tax bases, also taxes on nuclear fuels and on nuclear power stations and on electric pylons are environmental taxes. The profit taxes should be excluded.

### 2.2.9. Taxes in the ESA and SNA

#### NATIONAL ACCOUNTS FRAMEWORK

International statistical standards for national accounts are the world-level System of National Accounts — referred to as SNA — and its European version the 'European System of Accounts 2010' — referred to as ESA 2010 or ESA. ([18]) They provide accounting principles and a framework for the systematic and detailed description of a national economy, its components, and its relations with other economies.

([18]) Regulation (EU) No 549/2013 of the European Parliament and of the Council of 21 May 2013 on the European system of national and regional accounts in the European Union.

The latest version of the SNA is the SNA 2008 which has been prepared under the auspices of the Inter-Secretariat Working Group on National Accounts which consists of five organisations: the International Monetary Fund, the Organisation for Economic Cooperation and Development, the United Nations Statistics Division and regional commissions, the World Bank and Eurostat. The European equivalent to the SNA 2008 is the ESA 2010 which applies to all national accounts data that EU Member States submit to Eurostat.

The ESA constitutes the main reference for environmental tax statistics as far as national accounts principles are concerned.

The ESA framework provides for two generic ways of representing the national economy (ESA 2010 paragraph 1.06):

- the institutional sector accounts distinguishing corporations (S11 and S12), government (S13), households (S14), non-profit institutions serving households (S15), and the rest of the world (S2);
- the input-output framework, and the accounts by industries.

The sector accounts (by institutional sectors) are a sequence of T-accounts systematically describing the different stages of the economic process: production, generation of income, distribution of income, redistribution of income, use of income and financial and non-financial accumulation. Institutional units undertake a great number of economic actions which result in economic flows such as wages, taxes, fixed capital formation, etc. Transactions as described in the ESA 2010 (paragraph 1.66) can be of four main types: transactions in products, distributive transactions, financial transactions, and other transactions not included in the other three groups. Environmental taxes are distributive transactions. Taxes are described in detail in chapter 4 of the ESA.

The input-output framework portrays in detail the production and consumption activities by showing the flows of goods and services (output, imports, exports, final consumption, intermediate consumption, and capital formation by product group and by industry). The framework comprises supply and use tables and symmetric input-output tables. An important feature of these tables is that the data are presented in a breakdown by industries according to NACE, for example the A*64 breakdown required by Regulation (EU) No 691/2011.

## TAXES IN THE ESA AND SNA

The SNA 2008 defines taxes as 'compulsory, unrequited payments, in cash or in kind, made by institutional units to government units' ([19]). The term 'unrequited' means in this context that government provides nothing directly in return to the individual unit making the payment, although government might use the funds to provide goods or services to other units or to the community as a whole. This definition is consistent with the definition of taxes in the ESA (paragraphs 4.14 and 4.77).

In the ESA, there are three main categories of taxes (the codes in the parenthesis refer to the ESA 2010 codes for distributive transactions):

1. Taxes on production and imports (D.2)
2. Current taxes on income, wealth, etc. (D.5)
3. Capital taxes (D.91)

**Taxes on production and imports (D.2)** consist of 'compulsory, unrequited payments, in cash or in kind, which are levied by general government, or by the institutions of the European Union, in respect of the production and importation of goods and services, the employment of labour, the ownership or use of land, buildings or other assets used in production. Such taxes are payable irrespective of profits made.' (ESA 2010 paragraph 4.14).

Taxes on production and imports are divided into:

- taxes on products (D.21):
  - value added type taxes (VAT) (D.211);
  - taxes and duties on imports excluding VAT (D.212):
    - import duties (D.2121);
    - taxes on imports excluding VAT and duties (D.2122);
  - taxes on products, except VAT and import taxes (D.214);
- other taxes on production (D.29).

Taxes on products are directly related to the quantity or value of goods and services imported, produced or sold, while other taxes on production consist of all other taxes that enterprises incur as a result of engaging in production. Taxes on products are sometimes nationally called duties or excise duties (e.g., excises on fuels).

**Current taxes on income, wealth, etc. (D.5)** cover 'all compulsory, unrequited payments, in cash or in kind, levied periodically by general government and by the rest of the world on the income and wealth of institutional units, and

([19]) General government includes the following sub-sectors: central government (S.1311), state government (S.1312), local government (S.1313) and social security funds (S.1314).

some periodic taxes which are assessed neither on that income nor that wealth' (ESA 2010 paragraph 4.77).

Current taxes on income, wealth, etc. are divided into:

- taxes on income (D.51);
- other current taxes (D.59).

**Capital taxes (D.91)** consist of 'taxes levied at irregular and very infrequent intervals on the values of the assets or net worth owned by institutional units or on the values of assets transferred between institutional units as a result of legacies, gifts between persons, or other transfers' (ESA 2010 paragraph 4.148).

Environmental tax statistics uses the tax definition of the national accounts as a reference because this improves international comparability of the statistics and allows integration of the tax data with the national accounts and with systems of integrated environmental-economic accounting.

Most environmental taxes belong to national accounts category D.2 (taxes on production and imports), a few may belong to category D.59 (other current taxes) and very few may belong to category D.91 (capital taxes).

The legal definition of taxes may be different from the definition used in the national accounts and may differ across countries. Countries may choose, for national purposes only, to describe environmental taxes both from the legal and the national accounts perspective.

## BORDERLINE CASES BETWEEN TAXES AND OTHER TRANSACTIONS IN THE NATIONAL ACCOUNTS

The focus of environmental tax statistics is on taxes, rather than on other payments related to the environment such as transactions in products (e.g., sales of services) or payments of rents on sub-soil assets. There are some borderline cases where it can be difficult to distinguish and decide if an environmentally related payment to government should be classified as a tax or not.

Government collects beside taxes and social contributions other types of receipts such as licence fees, tolls, administrative charges, and royalties. These cover different types of transactions in national accounts and may be sales of services, taxes, sales of assets, rents on sub-soil assets or other transactions.

In principle, the definition used, and categorisation made in the national accounts of a country should be used for the environmental tax statistics as well.

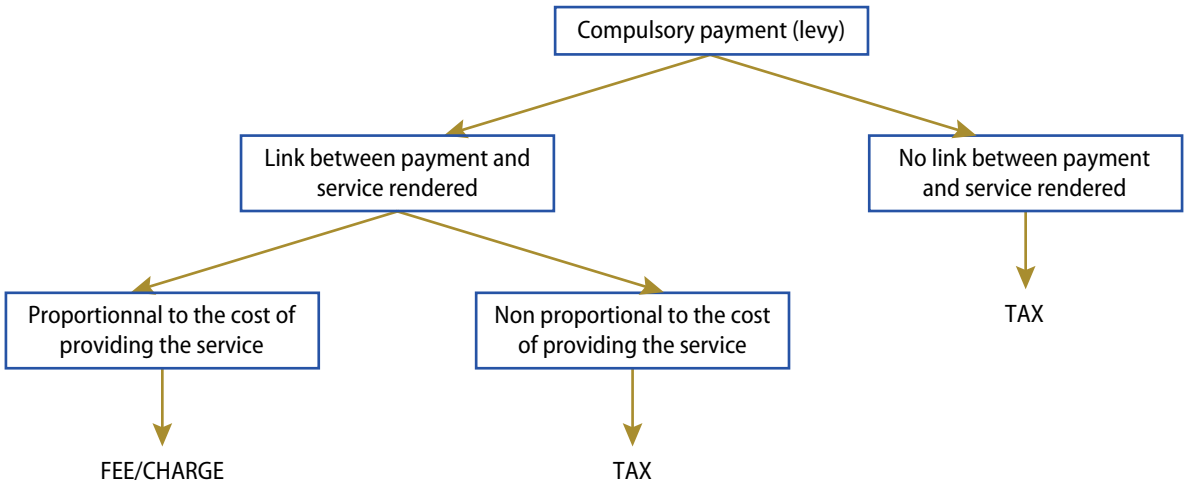
In practice, it is not always straightforward to assign a given transaction to a specific national accounts category. Borderline cases can occur, for example the case of financing local services with local taxes, in the case of payments for licenses or the payment of tolls or fees.

The distinction between sales of services and taxes is explained in the ESA 2010 in paragraphs 4.23e and 4.79d using the example of licences: if the licences are granted automatically on payment of the amounts due, their payment is treated as taxes. But if the government uses the issue of licences to exercise some proper regulatory function, for example, when the government carries out checks on the suitability or safety of the business premises, on the reliability or safety of the equipment employed, on the professional competence of the staff employed, or on the quality or standard of goods or services produced as a condition for granting such a licence or is checking the competence, or qualifications, of the staff/person concerned, the payments made are treated as purchases of services from government, unless the payments are clearly out of all proportion to the cost of the checks carried out by the government.

Therefore, the receipts of general government should be treated as sales of services if the government uses the issue of a licence to organise some proper regulatory function and if the payments are clearly in proportion to the cost of providing the services. Some examples are: driving or pilot licences; television or radio licences; and garbage disposal fees. The government receipts should be recorded as taxes if either of the two above conditions is not satisfied, examples being: licences for ownership or use of vehicles, licences to hunt, fish or shoot. These principles apply also to local services financed by local taxes and to fees, as illustrated in the following figure.

FIGURE 3

## Distinguishing taxes from fees and charges




In practice, it may happen that the detailed work of environmental accountants uncovers problems related to such borderline cases, e.g., that the national accounts categorisation is no longer up to date due to changes in relevant laws. In these cases, the environmental accountant is advised to discuss the issue with the national accountants.

An example in the environmental tax statistics is the resource taxes, e.g., taxes on the extraction of minerals. To the extent that these taxes are designed to capture the resource rent they should be classified in the national accounts as resource rents (D.45) rather than taxes.

An example for a shift from taxes to sales of services is when changes in the legal framework move a tax related to sewage across the border between taxes and sales of services so that the transaction should be reclassified.

### PAYMENTS SIMILAR TO TAXES BUT NOT RECORDED AS TAXES OR AS SALES OF SERVICES

Government regulation may force a number of transactions between institutional units in the economy, which otherwise would not take place or would not take place at that price or volume. An example of this is the different ways governments use to promote electricity production from renewable sources.

Some countries use schemes whereby the main electricity suppliers and grid operators are simply obliged by law to buy a given proportion of their electricity from renewable generators, possibly at a higher price set by law. Other countries have introduced a tax on electricity, the proceeds of which are earmarked to provide subsidies to the producers of electricity from renewable sources directly. Yet other countries use special contributions paid by consumers which are obligatory but are not payments to government. These schemes could take the form of quotas that are assigned to certain designated enterprises, people, or other groups that are either tradable or transferable.

It may be that the electricity price for consumers, the revenues of producers and the effect for the environment are identical under these different schemes. At the same time, there will be an environmental tax (combined with a subsidy) recorded in the case where a tax on electricity is introduced but not in the other cases.

Conceptually one could consider that when a law results in higher prices than would otherwise be paid, the resulting transaction could be partitioned into a 'normal payment', an imputed tax paid by the buyer and an imputed subsidy received by the seller. However, in practice it might be difficult to do this for each and every impact that government regulation has on the economy. This guide recommends being very restrictive about imputing taxes.

It is important for compilers of environmental tax statistics to be aware of the effects of the choice of policy instruments. It may be possible, for national purposes, to provide users with information not just on environmental taxes but also on related instruments such as fees and charges or obligatory contributions to finance renewable energy which are not taxes.

## 2.3. Further recommended readings

Environmental tax statistics constitute a fundamental element within the framework of environmental economic accounts, operating as supplementary accounts intricately intertwined with the national accounts. As a result of this integration, this handbook shares a direct connection with other guides pertaining to environmental economic accounts, aligning with the broader scope of the Eurostat statistical system's national accounts manual.

Furthermore, OECD manuals addressing environmental tax statistics, although variations in scope, provide a useful tool to statisticians and practitioners.

To facilitate a deeper exploration of other manuals and tools, the following publications can be read:

- Eurostat
  - Environmental protection expenditure accounts Handbook — 2017 edition
  - Environmental goods and services sector accounts Handbook — 2016 edition
- OECD
  - Methodological Guidelines for Environmentally Related Tax Revenue Accounts
  - Understanding National Accounts – Second edition revised and expanded
  - Taxation, Innovation and the Environment
- Government Finance Statistics
  - Manual on Government Deficit and Debt – Implementation of ESA 2010 2022 edition

# 3

# Classifications

In environmental tax statistics, the main ways to present data on environmental taxes are:

- according to the four categories of environmental taxes already described in section 2.2.5 (energy, transport, pollution, and resource taxes),
- by the economic activities paying the taxes according to the statistical classification of economic activities in the European Community (NACE), plus resident households as consumers and non-residents as required by Regulation (EU) No 691/2011.

Data on environmental taxes could also be classified by the standard national accounts categories (D.2, D.5 and D.91) described in section 2.2.9 or even by environmental protection domain or natural resource management domain according to the CEPA 2000, the CReMA 2008, and the CEP 2023.

This chapter presents the NACE, the CEPA, the CReMA, and the CEP classifications.

## 3.1. NACE

NACE is the statistical classification of economic activities in the European Community and is the subject of legislation at the European Union level, which imposes the use of the classification within all Member States. The currently applicable version is the NACE Rev. 2 as established by Regulation (EC) No 1893/2006 ([20]). This classification provides the framework for collecting and presenting a range of statistical data according to economic activity in the fields of economic statistics (e.g., production, employment, national and environmental accounts) and in other statistical domains. The broad structure of NACE Rev. 2 ([21]) is presented below.

([20]) http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:393:0001:0039:EN:PDF

([21]) http://ec.europa.eu/eurostat/ramon/nomenclatures/index.cfm?TargetUrl=LST_NOM_DTL&StrNom=NACE_REV2&StrLanguageCode=EN&IntPcKey=&StrLayoutCode=HIERARCHIC

**TABLE 2**

## Broad structure of NACE Rev.2

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

Environmental tax revenues have to be allocated according to NACE from the perspective of the tax payer. The obligatory breakdown according to Regulation (EU) No 691/2011 is the A*64 aggregation level as established by Commission Regulation (EU) No 715/2010 ([22]) which is used in the ESA. The full A*64 aggregation level is provided in the Annex.

It is important to note that since the last version of NACE Rev. 2. published in 2006, Eurostat has been working on updating the classification of economic activities in the new version NACE Rev. 2.1., which will include several new positions to reflect emerging forms of economic activity, while aiming to maintain the structure of the classification in areas where change is unnecessary. It was adopted by the European Commission in October 2022 and European statistics will start being produced based on NACE Rev. 2.1. from 2025 onwards. For European statistics referring to the period 2018-2024, NACE Rev. 2 will be used.

### 3.1.1. Who is the taxpayer?

In the context of environmental statistics, the tax payer refers to the entity or individual who is liable to pay the tax and the tax base is the specific aspect or activity that is being taxed. In many cases, the tax payer is also the unit using the tax base. For example, in the case of a vehicle emission tax, the individual or company who owns and uses the vehicle is responsible for paying the tax. Similarly, if there is a tax on the extraction of natural resources, the company undertaking the extraction activity would be the

([22]) http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:210:0001:0021:EN:PDF

taxpayer. Considering this, the different elements can be summarised as follows:

- Tax payer: The taxpayer is the entity or individual who is legally responsible for paying the tax. In the context of environmental taxes, the taxpayer is the one who is subject to the tax liability. This means they are obligated to pay the tax amount to the government or relevant authority.
- Tax base: The tax base is the specific factor or activity on which the tax is levied. For environmental taxes, the tax base is often related to environmentally harmful activities, resource usage, or pollution generation.
- Unit using the tax base: In the context of environmental tax statistics, the 'unit using the tax base' refers to the entity or individual that engages in the activity or uses the resources that are being taxed.
- Unit paying the tax: Often, the unit that is legally obligated to pay the tax is also the same entity that is using the tax base.

However, in some cases, governments may choose to collect taxes through intermediaries, such as importers or wholesalers, for efficiency reasons. For instance, certain taxes on products, like mineral oil tax, might be collected from companies or households purchasing the product, rather than directly from the end consumers. In these cases, data from tax authorities about individual tax-paying units must be used with caution, as the entity handing over the tax revenue to the government may not necessarily be the ultimate taxpayer for environmental tax statistics.

It is therefore important to differentiate between taxes where the entity handing over the tax revenue to the government is also the tax payer and taxes where the revenue collector is merely acting on behalf of the government.

Furthermore, for taxes levied on producers, the ultimate incidence of the tax may be passed on to consumers through higher prices of other products. However, in the context of environmental tax statistics, such considerations of final tax incidence are not relevant. Instead, the tax is allocated to the producer or entity responsible for the taxed activity, regardless of how it might affect the prices of other goods or services.

## 3.2. CEPA and CReMA

It may be possible to classify environmental taxes by more specific functions or environmental areas according to the CEPA and CReMA classifications.

The CEPA (European Commission, 2000) ([23]) is a multi-purpose classification used for example in environmental protection expenditure statistics and accounts to classify activities, products, and transactions. The table below presents the 1-digit level of CEPA. For the environmental taxes, CEPA classes 1 to 7, also called environmental domains, are the potentially most relevant ones.

**TABLE 3**

### CEPA 2000 classes

| |
|---|
| 1. Protection of ambient air and climate |
| 2. Wastewater management |
| 3. Waste management |
| 4. Protection and remediation of soil, groundwater and surface water |
| 5. Noise and vibration abatement |
| 6. Protection of biodiversity and landscapes |
| 7. Protection against radiation |
| 8. Research and development |
| 9. Other environmental protection activities |

The CReMA 2008 (or CReMA for short) is a classification for the management of natural resources developed originally for data collection on the environmental goods and services sector (EGSS), see Eurostat 2009 ([24]). Although initially developed in the context of the EGSS, the CReMA is a generic, multi-purpose, functional classification for resource management. It can be used for classifying activities but also products, actual outlays (expenditure) and other transactions whose primary purpose is resource management. The CReMA categories are complementary with CEPA, and the numbering of the CReMA classes follows the CEPA numbering. The table below shows the CReMA classes.

([23]) http://ec.europa.eu/eurostat/ramon/nomenclatures/index.cfm?TargetUrl=LST_NOM_DTL&StrNom=CEPA_2000&StrLanguageCode=EN&IntPcKey=&StrLayoutCode=HIERARCHIC

([24]) http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/publication?p_product_code=KS-RA-09-012

TABLE 4

## CReMA 2008 classes

| |
|---|
| 10. Management of water |
| 11. Management of forest resources |
| 12. Management of wild flora and fauna |
| 13. Management of energy resources |
| 14. Management of minerals |
| 15. Research and development activities for natural resource management |
| 16. Other natural resource management activities |

It may be possible to classify environmental taxes according to CEPA and CReMA. For example, environmental taxes related to transport and energy could mainly be classified in CEPA class 1 'Protection of ambient air and climate' as they help reduce the emission of greenhouse gases and other air pollutants. Taxes on hydroelectric power or taxes related to wild animals could be related to CEPA class 6 'Protection of biodiversity and landscapes', and taxes on nuclear power to CEPA class 7 'Protection against radiation'. Pollution taxes can be found theoretically in all CEPA classes, but in practice most of them would probably belong to CEPA classes 1, 2 and 3. Furthermore, according to the tax base, many energy taxes and some transport taxes could also be classified in CReMA class 13 'Management of energy resources', and resource taxes such as taxes related to water use could be classified as part of CReMA class 10 'Management of water'.

Cross-classifying environmental taxes according to CEPA and CReMA would allow linking the tax data to data on environmental protection expenditure and on emissions. Such a dataset could provide the basis for the analysis and modelling of combined effects on emissions of environmental taxes, environmental protection expenditure and resource management expenditure.

## 3.3. CEP

Another more recent development is the classification of environmental purposes (CEP), which is a generic, multi-purpose, functional classification used for classifying activities, products, expenditure, and other transactions related to environmental protection and management of natural resource.

The CEP is based on the CEPA and CReMA classifications and provides a comprehensive integrated functional classification for monetary environmental accounts to classify the environmental activities in scope of system of environmental-economic accounting central framework (SEEA CF).

The level 1 structure of CEP are the CEP divisions that are also called "environmental domains". At the first level split, the CEP groups together "homogeneous" environmental protection and/or resource management categories, i.e., categories that are linked together and represent borderline cases, such as for example in the case of activities related to biodiversity and forest.

The level 2 structure of CEP is the groups. At the second level split the environmental protection or resource management categories are singled out. This split also ensures a bridge with CEPA and CReMA as separate classification and is used to classify environmental activities, products, expenditure, and other transactions, so that time series reconciliation can be relatively easily established.

The level 3 split are the classes which provides, in almost all cases, an extra level of granularity with regard to the activities, actions, and expenditures that are object of the classification.

The CEP is intended to replace the current CEPA and CReMA classifications and will offer an integrated framework, flexible enough to ensure the collection and reporting of data on environmental activities and transactions, and the organisation of the information according to policy needs in the short, medium and long-term.

# 4

# Framework for data collection and reporting

This section offers a framework for the different steps that should be followed in the data collection and compilation reporting in order to comply with the requirements of Regulation (EU) No 691/2011. Some suggestions for environmental tax statistics for national purposes are also made and an overview of best practices for data compilation approaches are provided.

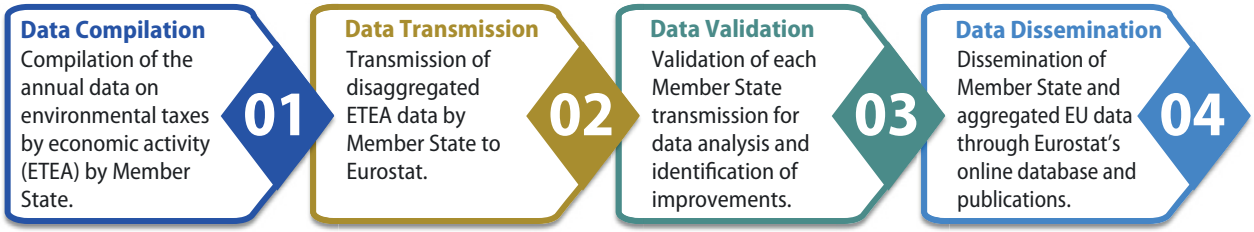
Environmental tax statistics should be prepared in close co-operation with the national accounts, both to ensure consistency and to reduce the amount of work involved.

## 4.1. Overview of process

The process for data collection and reporting can be sub-divided into four steps, namely, data compilation, data transmission, data validation, and data dissemination, as depicted in the following figure.

FIGURE 4

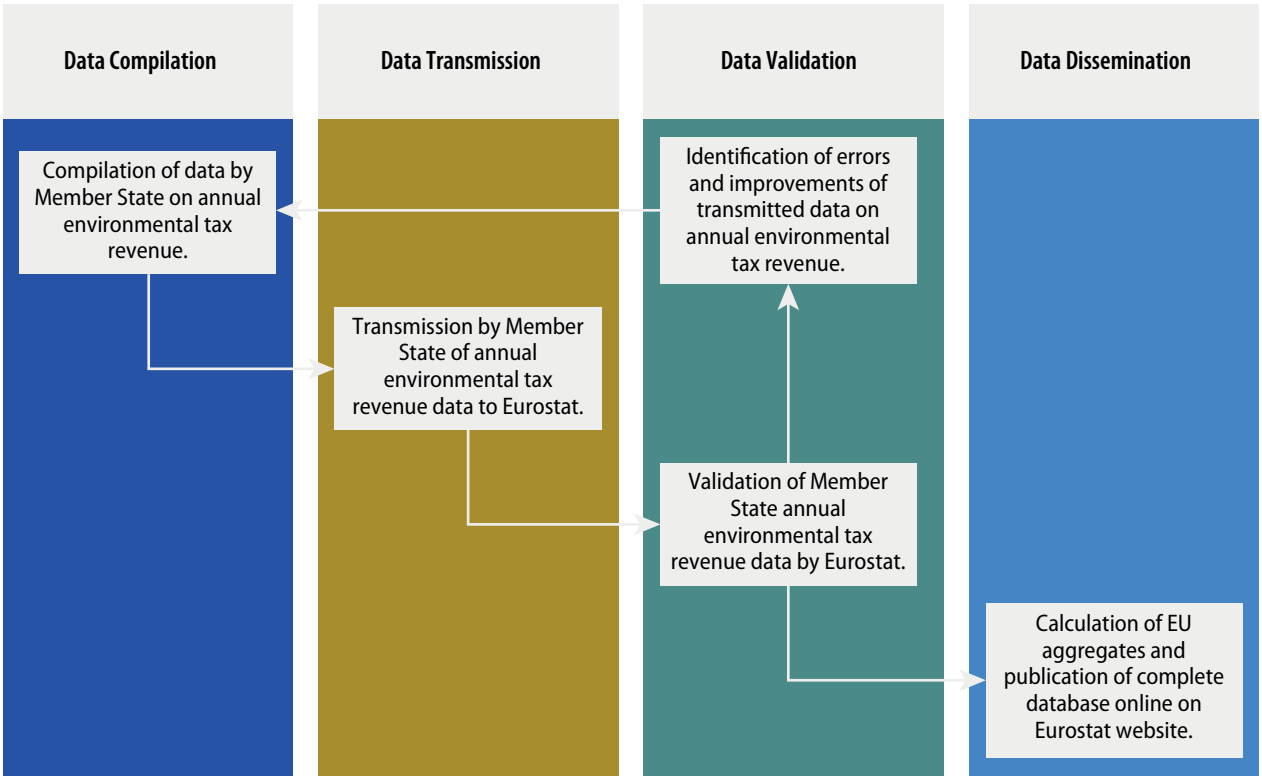
### Considered steps within the framework for data collection and reporting




Each step is associated with certain procedures and processes that both Member States and Eurostat adhere to, ensuring timely and quality reporting of the environmental taxes and subsidies at the European level. The following figure provides a visualisation of the sequence of the steps and the journey of the ETEA data.

FIGURE 5

## Flow diagram of the step-by-step process




The following sections provide more information on the different procedures and processes that are conducted within each of the different steps. Although this handbook is aimed at supporting the compilation of environmental tax statistics in EU Member States, and as such, the data compilation step is mainly focused on, the other steps in the framework for data collection and reporting are touched upon as well.

## 4.2. Data compilation

Compiling the ETEA data concerns the process of gathering, organising, and integrating various pieces of statistical data from different sources into a unified and structured dataset.

### 4.2.1. Basic approach

Compiling environmental tax statistics follows a five-step approach. Once the system is established, some steps can be simplified for the purposes of the annual updating routines. The five steps are:

1. Identify environmental taxes and establish a list of environmental taxes. ([25]) This should be done by comparing the tax bases with the list provided in section 2.2.4.
2. Classify the environmental taxes into the 4 categories of environmental taxes. This should be easy based on the list of tax bases presented in section 2.2.4 and the further guidance in section 2.2.5. For the rare case of a tax with several tax bases that come under different tax categories, the tax may be allocated to more than one tax category when the source data allow this split to be made. Alternatively, the predominance principle should be used.
3. Collect revenue data on these taxes using sources such as tax statistics, government finance statistics and the national accounts.
4. Allocate the revenue data to the environmental tax categories. This is a straight-forward step except if some

([25]) Countries may produce a second list of environmental taxes for national purposes where they include taxes that for national purposes are considered environmental but which are not part of international environmental tax statistics (e.g. some components of VAT, taxes on land, etc.).

taxes have several tax bases which fall into different tax categories.

5. Allocate the revenues to the economic activities paying the taxes. For this, different sources and methods may be used, e.g.:
   a. the supply–use tables from national accounts and other national accounts data.
   b. direct allocation of the revenues using data about the tax bases such as data on energy use, waste disposal data etc.
   c. direct allocation based on micro data about the tax payers for each environmental tax (e.g., data from the government bodies collecting the taxes).

Further detail for steps 1, 3 and 5 are provided in the following sections.

### 4.2.2. Establishing a list of environmental taxes

The starting point for the work on environmental taxes would ideally be a complete list of all government levies no matter what legal name is given to these levies (tax, charge, fee, duty, levy, etc.). The first step is then to identify the base(s) of each levy. The main sources of information about bases are the relevant laws and regulations. These should be available from the institution responsible for administration of the levies, usually the ministry of finance or taxation and finance departments of regional and local authorities. If the base is included in the list given in section 2.2.4 (Table 1), the levy would come on a list of environmental levies.

From this list, only payments that are defined as taxes in the country's national accounts should be considered further for the environmental tax statistics. Other levies could be the starting point for data sets and analysis at national level, including statistics on the wider concept of 'environmental payments to government' as described in the SEEA 2012.

A simpler but less complete approach is to directly analyse the list of taxes that is used for the national accounts compilation. Such a list can be obtained from the national accounts department. Most environmental taxes will be found in the ESA categories D.21 (taxes on products) and D.29 (other taxes on production), so these should be the main focus of the work.

At European level, an identification of environmental taxes is done for each Member State as part of the ESA transmission programme (table 9 and the national tax list). These national tax lists are published on DG TAXUD's website and on Eurostat's website and show for each tax the revenue and the economic function code. Environmental taxes have one of the following codes: E (for energy tax), T (for transport tax) or P / RS (for pollution or resource tax). Results of this exercise are published annually in a joint Eurostat and DG TAXUD publication called Taxation trends in the European Union.

A supplementary source that can be used is the OECD Policy Instruments for the Environment (PINE) database. The database contains information on the rules of each environmental tax, as well as revenue data for each tax, for over 130 countries. The information in this database has been provided by ministries of finance and ministries of environment in each country and may not necessarily be aligned with the national accounts definitions.

The national tax lists do not necessarily identify all environmental taxes. The accuracy of the process of identifying environmental taxes relies heavily on the degree of disaggregation available in the source data. An issue with the national tax lists can be that environmental taxes, particularly those levied on pollution, may raise little revenue and may often be regional or local taxes. Small taxes tend to be aggregated into broader tax categories (for example 'other regional taxes'); in which case some environmental taxes could go undetected. Where the environmental accountants find a tax that is not properly labelled as environmental in the national tax list or that is not separately shown, they are advised to discuss this with their national accounts colleagues with the aim that the data reporting via the national tax list is coherent with the reporting of environmental tax statistics under Regulation (EU) No 691/2011.

### 4.2.3. Data sources for environmental tax revenues

Tax statistics, GFS and the national accounts are the main sources of data on revenue for the different kinds of taxes.

Tax statistics are usually published by finance ministries and revenue offices. Often such statistics are available on a monthly basis and very shortly after the end of the reference period. These statistics give detailed information on taxes and social contribution, and other government revenues broken down by type of tax or revenue and level of government. These statistics also give information on tax bases and rates. Tax statistics are usually on a cash basis, i.e., taxes are recorded in the period they are paid. In the national accounts, taxes are recorded in the period

they accrue, whether or not they are actually paid in that period ([26]).

A noteworthy issue may arise concerning certain taxes in a general or international context that are not categorised as taxes within the specific context of a nation's accounting system. Consequently, these payments are excluded from the statistics that pertain to taxes, potentially leading to discrepancies and omissions in the overall assessment of environmental taxes. This challenge underscores the importance of harmonizing tax classifications and definitions across various economic and environmental reporting frameworks to ensure accurate and comprehensive reporting of environmental taxes and their impact on different economic activities.

GFS data include both the financial (borrowing and lending) and non-financial (income and expenditure) activities of government. European GFS are produced in accordance with the ESA. This means that data are based on the accruals principle. GFS also includes data on fees.

The published national accounts provide data on taxes in an aggregated form. The detailed revenue data for individual taxes usually are not published, so access to the data bases underlying the national accounts compilation will be required.

### 4.2.4. Allocating environmental tax revenues to categories

Allocating the revenue data to the environmental tax bases is generally a straight-forward step. Some taxes have several tax bases, but revenue data are only available for the whole tax. This is not a problem as long as all tax bases belong to only one environmental tax category. There may also be cases where some tax bases are environmental, and others are not within the same tax. ([27]) In such cases, additional information is needed to be able to split the revenue.

Information to estimate the revenue for each tax base separately may be data directly from the fiscal administration, data on the volumes of the tax bases combined with information on tax rates and exemptions, or expert estimates. When no allocation key is available, the predominance principle should be used. This principle foresees to classify the tax in the principal or predominant category. The predominance principle may also be used immediately when the revenues at stake are very small.

### 4.2.5. Allocating environmental tax revenues to paying economic activities

According to Regulation (EU) No 691/2011, environmental tax revenues need to be allocated to 64 industries in the breakdown by NACE Rev. 2 A*64, resident households as consumers and non-residents. The following section describes the general principles.

Experience in countries has shown that good data quality is achieved by using the best source data available nationally which differs a lot across countries. Relevant country studies that provide ideas for possible sources and methods are available ([28]).

There are two main approaches for the allocation of taxes by economic activities:

- based on the national accounts (mainly supply and use tables), and
- based on direct allocation of the revenues using data about the tax bases such as data on energy use, waste disposal data etc.

A third option can be direct allocation based on micro data from the fiscal administrations about tax payers for each environmental tax separately. Using a common identifier, the tax payers can be identified in the business register allowing allocation to the A*64 NACE breakdown. This method would be ideal but in many countries such data are not available. Furthermore, this method is not usable for the frequent situation where the unit submitting the collected tax revenue to government is not the final purchaser and user of the tax base. For example, governments collect mineral oil taxes from the wholesalers or retailers of energy products so that the fiscal administration's database about tax payers will show that all mineral oil taxes are collected from units in NACE Rev. 2 section G wholesale and retail trade) whereas the tax should be allocated to the final purchaser and user of the tax base, which in this

([26]) In practice, it is often difficult to carry out exact transformations from cash basis to accrual basis, and approximations have to be used (ESA 2010 paragraphs 1.101 – 1.105). Many EU countries use time-adjusted cash tax receipts in their national accounts. This method uses information about the time difference between the activity that generates the tax liability and the payment of the tax.

([27]) An example can be an industrial emissions tax with a production component where a portion of the tax is determined by the level of emissions emitted by the industrial facility while the remaining portion is based on the production capacity or output of the industrial facility and thus tied to the economic activity rather than environmental concerns.

([28]) See the catalogue of pilot studies related to environmental accounts available at http://epp.eurostat.ec.europa.eu/portal/page/portal/environmental_accounts/introduction

instance could be NACE Rev. 2 section I-U (Services (except wholesale and retail trade, transportation and storage). Another example is where vehicle sales taxes may be collected by the retailers whereas the taxes have to be allocated to the users.

The best approach is probably to apply a mixed approach using both national accounts and environmental accounts or administrative data to allocate directly tax revenues to an economic activity. In summary, the best approach would be to use a combination of national accounts and direct allocation of the revenues integrating the broad perspective from national accounts with the granularity of direct data, providing a comprehensive and accurate basis for allocating environmental tax revenues to various economic activities. Section 4.2.7 on the country compilation approaches and best practices provides an assessment of the most effective approaches and associated favourable outcomes.

## NATIONAL ACCOUNTS DATA

The national accounts contain information about which industries and sectors are paying taxes. Information on taxes can be found in the institutional sector accounts for the government, in the supply and use tables and in the generation of income account.

The supply and use tables will usually provide information on taxes and subsidies on production. These taxes consist of two main categories, taxes on products and other taxes on production. The supply and use tables will show other taxes on production in a breakdown by industries. The taxes on products will be shown classified by product but not by industry. The supply and use tables will then show who uses these products but separate tables directly showing taxes on products by user category may not be available in all countries. The supply and use tables described in chapter 9 of ESA 2010 contain a simple 'taxes less subsidies on products' table (ESA 2010 -Table 9.8) in this format.

A potential problem when using this kind of information is that there may be several taxes on the same product in the supply and use tables not all of which are environmental. One option is to get access to the detailed calculations the national accountants have undertaken to estimate the taxes for each category. If this is not sufficient, the share of environmental tax revenues will have to be estimated. If the share of each tax can be assumed to be equal for all users, the revenue from each tax can be distributed in the same way as the total tax revenue on the product. If the shares differ across users, additional information is required to make the distribution, for example information can be physical data on the different tax bases involved combined with information on tax rates, tax exemptions etc.

Another potential problem is that the supply and use tables show the product detail for household final consumption expenditure and for imports and exports based on the domestic concept rather than the national concept (i.e., the basis is sales on the territory rather than purchases by resident units - see section 4.2.6 for more detail). This presentation is combined with adjustment items to move from the data based on the domestic concept to the data based on the national concept but for these adjustment items the product breakdown is not obligatory.

Member States have to submit final supply and use tables according to the ESA transmission programme, which is not in line with the submission timeline for environmental tax statistics. ([29]) It may therefore happen that when the allocation work for environmental taxes is done, the supply and use tables for the latest reference year are not yet available nationally. In this case a distribution key derived from the latest available supply and use tables can be used. The allocation of environmental taxes should be revised once the new supply and use tables become available.

## DIRECT ALLOCATION BASED ON DATA ON THE TAX BASE

The method consists in estimating the use of the tax base for each industry and for households and using this information to allocate the tax revenue to payers. The method requires combining data on the tax base with data on tax rates and on tax exemptions.

Tax bases could be the volume of emissions for the emissions taxes and traded volumes of the different products for the product taxes. The units can be kg of SO2 emitted, litres of diesel or the number of cars sold, for example. If possible, the classification of users should align with the tax rules (nominal tax rates, exemptions).

The tax authority is a possible source for physical data on the tax bases, since this type of information is often required to assess the tax payments.

Physical data on emissions to air and water, the use of energy products etc. may be available in tables based on the environmental accounts framework. For example, air emissions accounts in an industry breakdown are available for all EU Member States. Several countries have also

([29]) The timeline for Member States to submit final supply and use tables is T+36 months.

compiled data on energy and resource use, water use, wastewater and solid waste in an industry breakdown.

Another source of physical data on the supply and use of energy products are energy balances. The sources of supply are primary production, imports and transformation output (from refineries, power plants etc.). The use side is divided into transformation inputs (to refineries, power plants etc.), final energy and non-energy consumption in different industries, final energy consumption in households and exports.

For the tax revenues from emission permits, because these are other taxes on production, the national accountants must allocate the payments to A*64 industries in the use table. A high quality allocation to industries can be very challenging as some industries received free permits and other permits are internationally traded so that the average amount paid per permit may differ significantly across industries. Countries could use the data held in their national emission permits registers and average prices to allocate the revenue by industry. The data held in the registers must be kept confidential for 5 years but some NSIs have managed to get aggregated data from their registers. Since 2013 there is a new EU register Registry ([30]) that serves to guarantee accurate accounting for all allowances issued under the EU ETS, which could be a useful source.

Sometimes, each environmental tax will be related to only one tax base, but in other cases a tax will have several tax bases. As an example, the tax bases for the mineral oil tax might be different types of petrol, diesel and light fuel oil. In this case it is necessary to distribute the tax revenue across these various tax bases using additional information.

Effective tax rates can be a useful tool. The effective tax rates refer to the taxes actually paid per unit of the different products and activities and should reflect exemptions, reduced rates etc., in addition to the nominal tax rates. If the tax bases concern more than one product or activity, the effective tax rate should represent the weighted average tax rate of the different components, with the physical volumes of emissions or products traded as weights.

The market price per unit traded of some products can be relevant information for the estimation of the amounts of environmental taxes paid by a certain payer in two cases. The first case is when the tax is based on the value of a product (e.g., one off vehicle taxes may be based on the sales price).

The second case is when the tax base is a physical unit but information about the distribution of the use of this tax base is available in monetary terms. For example, information on the use of different energy products by industries may be available in monetary terms. When the price of a product differs significantly across industries (as is the case for e.g., electricity or natural gas), the monetary data need to be converted into physical units using the relevant prices. Price information can be found in e.g., energy price statistics.

For cars and other vehicles, it should be relatively easy to find market prices. Calculating a weighted average price requires a lot of information, however. A possible solution is to use national accounts estimates of the expenditure on vehicles for household consumption and gross fixed capital formation, and divide them by the registration figures.

### 4.2.6. Taxes paid by non-residents

A part of the revenue of environmental taxes collected by the national government will be paid by non-residents. The category 'non-residents' in Annex 2 of Regulation (EU) No 691/2011 means 'non-resident households and other non-residents' so that this category comprises non-resident households (ESA 2010 paragraph 2.10), corporations and foreign governments (e.g., military bases or embassies).

The overall significance of taxes paid by non-residents may be relatively small for most countries. In practice, transport fuels are by far the most important issue, in particular taxes on petrol and diesel purchased by non-resident households (leisure tourists) or non-resident companies (e.g., truck drivers or business travellers). One way to separate residents and non-residents for transport fuels is to use the source data that are also used for the air emissions accounts, e.g., the COPERT ([31]) model used for calculating air emissions from road transport. This will also ensure coherence between environmental taxes and air emissions accounts.

Other product taxes could also be paid by non-residents (taxes on batteries, plastic bags, etc.). There could also be some taxes in relation to transport where non-residents have to pay, e.g., airport landing taxes, harbour taxes or road taxes.

In the environmental tax statistics, the taxes on products (e.g., fuel taxes) are considered to be paid by the users of the taxed products. Several countries use supply and use tables as a source for allocating these taxes to payers. According

([30]) https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/union-registry_en

([31]) http://www.eea.europa.eu/publications/copert-4-2014-estimating-emissions

to the ESA transmission programme, the product detail for household final consumption expenditure and for imports and exports in the supply and use tables is based on the domestic concept rather than the national concept (i.e., the basis is sales on the territory rather than purchases of resident units). The ESA transmission programme includes adjustment items to move from the data based on the domestic concept to the data based on the national concept. Imports, exports and household final consumption expenditure are adjusted to take into account the purchases of residents abroad and the purchases on the economic territory by non-residents. However, these adjustment items do not have to be provided in a product breakdown according to the ESA transmission programme. This lack of product detail makes the adjustment items less useful for purposes of allocating environmental taxes to payers. Determining for each taxed product the share of residents and non-residents may be possible based on the data sets underlying the national accounts supply and use tables. Alternatively, supplementary direct sources may have to be used.

In some countries, direct estimates of taxes paid by non-residents may be available from tax authorities. Environmental accounts can also provide information. For example, from the air emissions accounts or from the energy flows accounts the amounts of energy products purchased abroad and estimates of kilometres driven abroad may be available. Data for purchases made by non-residents in a country are available in the national accounts as these purchases have to be treated as exports. It may be possible to use this information directly. Administrative data sources may also be used (e.g., vehicle counts that would allow estimating road taxes paid by foreigners).

Environmental tax statistics does not require estimating the environmental taxes paid by resident units to foreign governments. Using the government revenue as the basis for allocating taxes to industries means using the territory principle for environmental taxes by economic activities. It also means that resident units do pay some environmental taxes which are not allocated to them in the environmental accounts. For the implicit tax rate on energy there is no conceptual problem because both energy tax revenue (received by the national government) and energy consumption from energy statistics are based on the territory principle.

### 4.2.7. Country compilation approaches and best practices

To effectively measure the impact of environmental taxes and devise targeted policies, it is essential to adopt appropriate compilation approaches. There are various advantages of environmental taxation given the different compilation approaches by tax type, such as direct allocation from National Accounts (NA) and Supply and Use Tables (SUT), NACE category-based distributions, and other systematic methods, which facilitate transparent and accountable data compilation. By understanding the positive aspects and nuances of the presented approaches, certain best practices in environmental taxation compilation are identified.

Eleven key environmental taxes were selected, taking into consideration the number of countries to which these taxes are applicable. The selection process involved identifying taxes that are relevant and applicable across multiple countries, ensuring a broad representation of taxation practices.

The following table presents the most effective approach and its associated favourable outcomes of specific environmental taxes like those on natural gas, carbon dioxide, waste, water, air travel, and fishing.

**TABLE 5**

## Most effective data compilation approaches of key environmental taxes

| Tax name in the NTL | Most effective approach | Favourable associated outcomes |
|---|---|---|
| **Excise duties on mineral oil** | Allocation by National Accounts and SUT | • Coherent, consistent, and contextualized data<br>• Clear definitions and scope<br>• Standardized reporting templates for transparency and accountability, and international comparisons |

| Tax name in the NTL | Most effective approach | Favourable associated outcomes |
|---|---|---|
| **Excise duties on natural gas** | Allocation by NACE based on SUT, surveys, National Accounts and administrative data | • Exhaustive coverage, mutually exclusive categories, and consistent allocation<br>• Coherent, consistent, and contextualized data<br>• Standardized reporting templates for transparency and accountability, and international comparisons<br>• Collaborative action and knowledge transfer |
| **Electricity tax** | Allocation by NACE based on SUT, surveys, National Accounts and administrative data | • Exhaustive coverage, mutually exclusive categories, and consistent allocation<br>• Coherent, consistent, and contextualized data<br>• Standardized reporting templates for transparency and accountability, and international comparisons<br>• Collaborative action and knowledge transfer |
| **Tax on emission allowances (GHG, $CO_2$ eq)** | Distribution over the industries or sectors which have to pay for their emission permits or have traded in emission permits | • Targeted reporting of tax burden<br>• Transparency and accountability for monitoring and evaluation<br>• Comparative analysis across sectors<br>• Policy effectiveness evaluation<br>• Contribution to EU ETS |
| **Duty on carbon dioxide ($CO_2$)** | Direct allocation from data from SUT matrices for taxes on products allocated to NACE categories | • Granularity of the tax across industries and products<br>• Accurate, consistent and comparable data for monitoring and evaluation<br>• Facilitates sector-specific actions as it provides insights into carbon tax burden across industries<br>• Understanding emission drivers based on the direct allocation of $CO_2$ taxes by NACE |
| **Excise duties on cars** | Allocation by NACE based on SUT, surveys, National Accounts and administrative data | • Exhaustive coverage, mutually exclusive categories, and consistent allocation<br>• Coherent, consistent, and contextualized data<br>• Standardized reporting templates for transparency and accountability, and international comparisons<br>• Collaborative action and knowledge transfer |
| **Motor vehicle registration tax** | Direct allocation using the National Accounts tax matrices and SUT | • Accurate and credible as it is based on official accounting records<br>• Detailed and specific allocation of the tax burden and tax contribution<br>• Comprehensive coverage and consistency with economic data<br>• Allows benchmarking for cross-country comparisons and further implementation |
| **Air travel tax** | Distribution between "tax over production" and "tax over products" with the corresponding NACE based on the National Accounts (approach in France) | • Comprehensive, accurate and reliable as the data is based in official accounting records<br>• Specificity of tax burden breakdown by distinguishing between production and products<br>• Holistic perspective via the two-sided approach – production and products, that allow understanding the tax impact on the two segments of the air travel sector |

| Tax name in the NTL | Most effective approach | Favourable associated outcomes |
|---|---|---|
| **Duty on waste** | Direct allocation from the National Accounts and SUT by NACE | • Granular breakdown of the duty on waste by economic activities<br>• Provides a detailed view of the waste generation and related duties within different industries and sectors<br>• Policy targeting based on the direct allocation by NACE categories, allowing policymakers to identify specific industries or sectors that contribute significantly to waste<br>• Consistency with economic data as reported within the NACE framework, easing its impact analysis to broader economic indicators |
| **Taxes on water** | Allocation from the National Accounts and the related NACE category | • Accuracy, specificity, transparency, and consistency with economic data<br>• Facilitates benchmarking for international comparison and sharing best practices in water taxation and management<br>• Alignment between economic activity and environmental objectives given the use of the NACE framework<br>• Monitoring trends in tax revenues related to water use over time<br>• Eases the evaluation of the effectiveness of water taxation policies |
| **Fee on fishing** | Allocation from the National Accounts | • Accuracy and reliability as the use of NA provide official and comprehensive economic data<br>• Wide coverage of economic activities, capturing fishing activities across different sectors and regions<br>• Transparent and accessible data, as it is data from the NA, that enhances informed decision-making<br>• Engaging stakeholders given the nature of the NA data, allowing for constructive discussions, collaboration, and feedback from fishing industries and related |

## 4.3. Data transmission

Data at an aggregate level is collected by Eurostat from Member States. The content of the data is defined by Regulation (EU) No 691/2011 and within the framework for ETEA data collection and reporting, Member States are required to transmit:

- Data through the ETEA Excel questionnaire.
- Quality report defining the associated processes to the data.

### 4.3.1. Data confidentiality

Regulation (EC) No 223/2009 ([32]) on European statistics defines the data confidentiality procedures that are adhered to with regards to ETEA data from Member States. Recital 24 and Article 20(4)) of Regulation (EC) No 223/2009 stipulates the need to establish common principles and guidelines ensuring the confidentiality of data used for the production of European statistics and the access to those confidential data with due account for technical developments and the requirements of users in a democratic society.

([32]) https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:087:0164:0173:En:PDF

Article 3(7) of Regulation (EC) No 223/2009 defines statistical confidentiality as:

> *'the protection of confidential data related to single statistical units which are obtained directly for statistical purposes or indirectly from administrative or other sources and implying the prohibition of use for non-statistical purposes of the data obtained and of their unlawful disclosure'.*

Confidential data obtained exclusively for the production of European statistics is thus exclusively used for statistical purposes and only accessible to staff working in statistical activities within their specific domain of work. Furthermore, the transmission of confidential data within the ESS ([33]) and between the ESS and the European System of Central Banks (ESCB) may only take place provided that this transmission is necessary for the efficient development, production, and dissemination of European statistics or for increasing the quality of European statistics.

### 4.3.2. Transmission channels

The transmission of ETEA datasets is managed by EDAMIS (Electronic Data Files Administration and Management Information System), adopted as the unique integrated environment for the transmission of data to Eurostat. The system facilitates accurate transfer of statistical data between Member States and Eurostat.

The EDAMIS portal is accessible via the following link: https://webgate.ec.europa.eu/edamis4

### 4.3.3. Support for Member States

Support is provided to Member States for data transmission by local EDAMIS coordinators and the Eurostat EDAMIS helpdesk (mailto: estat-support-edamis@ec.europa.eu).

## 4.4. Data validation

The data validation ensuring the quality of the assembled ETEA data by Member States is a crucial element in the framework for data collection and reporting of environmental tax statistics. Several logical checks between different variables are performed and the consistency of data over time is checked as well before the ETEA data is published.

Eurostat performs ETEA data validation by verifying whether data are in accordance with certain basic criteria that serve to assess the plausibility of the given data. The quality assurance and documentation of the quality is a joint responsibility of Eurostat and the Member States depending on the producer of the underlying data source.

To ensure quality of the data Eurostat implements the following procedures/guidelines:

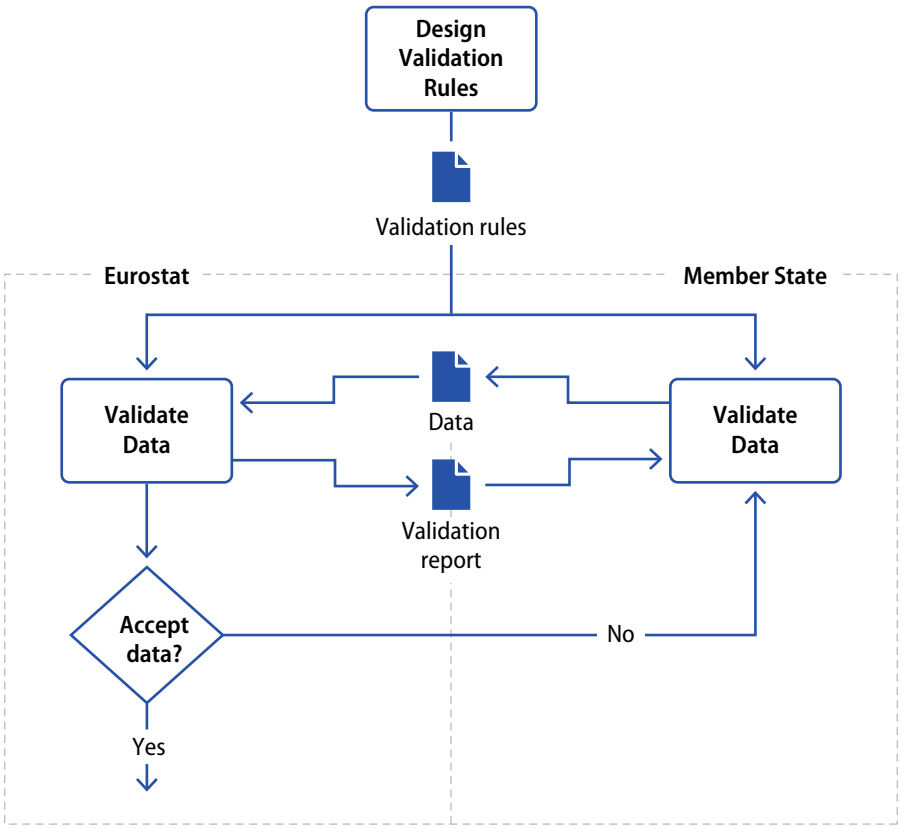
1. Methodological guidelines to assist countries.
2. Use of validation tools notably informing of:
   a. differences between a total value and the sum of its components
   b. the non-respect of confidentiality rules;
   c. the presence of new data;
   d. the cases of deleted data;
   e. the magnitude of revisions;
   f. plausibility checks of year-to-year changes;
   g. consistency with national accounts data.

The validation process follows a sequence of activities to ensure harmonised validation activities. To initiate the process, common standards for validation are defined and common validation tools to be used are provided. According to these validation rules, Member States assemble ETEA data and transmit this data to Eurostat. Then, Eurostat validates the data through several checks that are summarised in a validation report, which is shared with the relevant Member State. Potential issues or improvements are outlined in the validation report, and the Member State will require to provide sufficient justification of the assembled data or correct the date, where necessary. Only when the data is accepted according to the validation rules, will the data be disseminated. The following figure provides an overview of the data validation workflow.

([33]) The ESS is the partnership between the Community statistical authority, which is the Commission (Eurostat), and the national statistical institutes (NSIs) and other national authorities responsible in each Member State for the development, production and dissemination of European statistics.

**FIGURE 6**

## Data validation workflow




## 4.5. Data dissemination

Once Eurostat received and validated all Member States' ETEA data and the European aggregates are determined, the results are published online through several dissemination channels.

### 4.5.1. Database

ETEA data are published within Eurostat's Database ([34]) under the theme 'Environmental taxes (t_env_eta or env_eta)' of the 'Environment and energy' heading. Specific data on the environmental tax revenue by Member State and the European Union (EU) aggregated totals are available. EU aggregates (total tax revenues by category) are derived by summing up country totals.

### 4.5.2. Statistical articles

Statistics explained is an official Eurostat website presenting statistical topics in an easily understandable way. The 'Environment – economic issues' ([35]) page contains all articles in the statistical theme Environment on economic aspects of environmental impacts and protection, which includes articles related to ETEA data, namely:

- Environmental tax statistics
- Environmental tax statistics – detailed analysis

In addition, the 'Tax revenue statistics' ([36]) article contains all national tax lists that are validated and published by Eurostat.

([34]) https://ec.europa.eu/eurostat/web/main/data/database
([35]) https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Category:Environment_-_economic_issues
([36]) https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Tax_revenue_statistics

### 4.5.3. Other publications

Eurostat also publishes information concerning environmental taxes through other channels, namely:

- 'Key figures on Europe' articles ([37]) providing a selection of interesting key statistics on the European Union (EU), its Member States as well as the countries of the European Free Trade Association (EFTA) such as, among others, the current situation and recent developments across the EUR with regard to the environment and natural resources. They can be seen as an introduction to EU statistics and provides a starting point for those who wish to explore the wide range of data that is freely available on Eurostat's website.
- Statistical books/Pocketbooks ([38]) on environmental statistics such as the 'Energy, transport and environment statistics – 2020 edition' ([39]).

([37]) https://ec.europa.eu/eurostat/web/main/publications/key-figures

([38]) https://ec.europa.eu/eurostat/web/products-statistical-books

([39]) https://ec.europa.eu/eurostat/web/products-statistical-books/-/ks-dk-20-001

# 5

# Presentation and interpretation of data – tables and indicators

This section presents information of environmental tax revenue at EU level, including environmental tax revenue data by tax category, as a share in total environmental taxes, as a share in GDP and as a share in total revenue from taxes and social contributions. Furthermore, information is provided on the EU level implicit tax rates and on interpreting certain indicators.

Further examples of the way data and indicators derived from environmental tax statistics can be presented are available on the Eurostat website ([40]) or in publications of national statistical offices.

## 5.1. Environmental tax revenue by category

The set of tables in this sub-section is dedicated to presenting the chronological trends for the environmental tax revenue by tax category.

### 5.1.1. Revenue from environmental taxes by category

Presented here is a basic tax revenue table displaying time series data depicting revenue from environmental taxes for the main categories energy, transport, pollution and resource taxes for the EU in the period 2010-2021.

**TABLE 6**

**EU-27 environmental tax revenue, 2010-2021** (billion EUR)

| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total environmental taxes** | 259.6 | 272.4 | 278.5 | 284.1 | 291.0 | 299.0 | 310.2 | 316.6 | 324.7 | 329.9 | 300.2 | 325.8 |
| **Energy taxes** | 198.6 | 209.4 | 215.3 | 220.8 | 226.3 | 231.7 | 241.2 | 246.0 | 252.1 | 256.7 | 232.4 | 255.3 |
| **Transport taxes** | 52.0 | 53.6 | 53.4 | 53.6 | 54.7 | 56.7 | 58.4 | 59.9 | 61.9 | 62.5 | 57.2 | 59.1 |
| **Pollution and resources taxes** | 8.9 | 9.3 | 9.7 | 9.7 | 10.1 | 10.6 | 10.5 | 10.7 | 10.6 | 10.7 | 10.7 | 11.5 |

*Source:* Eurostat (env_ac_tax)

([40]) See e.g. the Statistics Explained articles on Environmental taxes and on Environmental taxes – detailed analysis

### 5.1.2. Revenue from environmental taxes by category, as a percentage of total revenue from environmental taxes

The next table illustrates the proportion contributed by the main tax categories to the total revenue generated from environmental taxes. This can be referred to as the structure of the environmental taxes, i.e., comparative significance of energy, transport, pollution, and resource taxes. In the EU context, energy taxes contribute to slightly more than ¾ of the environmental tax revenue.

**TABLE 7**

## EU-27 environmental tax revenue, 2010-2021 (Percentage of total revenue from environmental taxes)

| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Energy taxes** | 76.5 | 76.9 | 77.3 | 77.7 | 77.8 | 77.5 | 77.8 | 77.7 | 77.7 | 77.8 | 77.4 | 78.4 |
| **Transport taxes** | 20.0 | 19.7 | 19.2 | 18.9 | 18.8 | 19.0 | 18.8 | 18.9 | 19.1 | 19.0 | 19.0 | 18.1 |
| **Pollution and resources taxes** | 3.4 | 3.4 | 3.5 | 3.4 | 3.5 | 3.5 | 3.4 | 3.4 | 3.3 | 32 | 3.6 | 3.5 |

*Source:* Eurostat (env_ac_tax)

### 5.1.3. Revenue from environmental taxes by category, in per cent of total revenues from taxes and social contributions

The distribution of environmental taxes and the main environmental tax categories within the total revenues from taxes and social contributions can also be displayed. The indicator 'total revenue from taxes and social contributions' includes all taxes (D.2, D.5 and D.91) as well as actual and imputed social contributions (D.61 and 6.12). The share of environmental taxes can serve as an indicator for the tax burden on the use of the environment and in particular as indicators for the tax shift inherent in a green tax reform.

**TABLE 8**

## EU-27 environmental tax revenue, 2010-2021 (Percentage of total revenues from taxes and social contributions)

| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total environmental taxes** | 6.05 | 6.09 | 604 | 6.02 | 6.02 | 5.99 | 6.04 | 5.90 | 5.83 | 5.74 | 5.42 | 5.38 |
| **Energy taxes** | 4.63 | 4.68 | 4.67 | 4.68 | 4.68 | 4.64 | 4.70 | 4.58 | 4.53 | 4.47 | 4.20 | 4.22 |
| **Transport taxes** | 1.21 | 1.20 | 1.16 | 1.14 | 1.13 | 1.14 | 1.14 | 1.12 | 1.11 | 1.09 | 1.03 | 0.98 |
| **Pollution and resources taxes** | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.20 | 0.19 | 0.19 | 0.19 | 0.19 |

*Source:* Eurostat (env_ac_tax)

### 5.1.4. Revenue from environmental taxes by category, as a per cent of GDP

The following table illustrates the revenue from total environmental taxes and for the tax categories as percentage of GDP. Similar to the proportions of total revenue from taxes and social contributions in Table 9, the percentages of GDP can be seen as an indicator for the tax burden on the use of the environment. Unlike the data in Table 9, these percentages will not be affected by changes in the total tax level of the economy, i.e., total taxes and social contributions in per cent of GDP.

**TABLE 9**

## EU-27 environmental tax revenue, 2010-2021 (Percentage of GDP)

| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total environmental taxes** | 2.36 | 2.40 | 2.44 | 2.47 | 2.47 | 2.45 | 2.47 | 2.42 | 2.40 | 2.35 | 2.23 | 2.24 |
| **Energy taxes** | 1.81 | 1.85 | 1.89 | 1.92 | 1.92 | 1.90 | 1.92 | 1.88 | 1.86 | 1.83 | 1.73 | 1.76 |
| **Transport taxes** | 0.47 | 0.47 | 0.47 | 0.47 | 0.46 | 0.46 | 0.47 | 0.46 | 0.45 | 0.45 | 0.42 | 0.41 |
| **Pollution and resources taxes** | 0.08 | 0.08 | 0.09 | 0.08 | 0.09 | 0.09 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 |

*Source:* Eurostat (env_ac_tax)

## 5.2. Environmental tax revenue by tax category and by payer

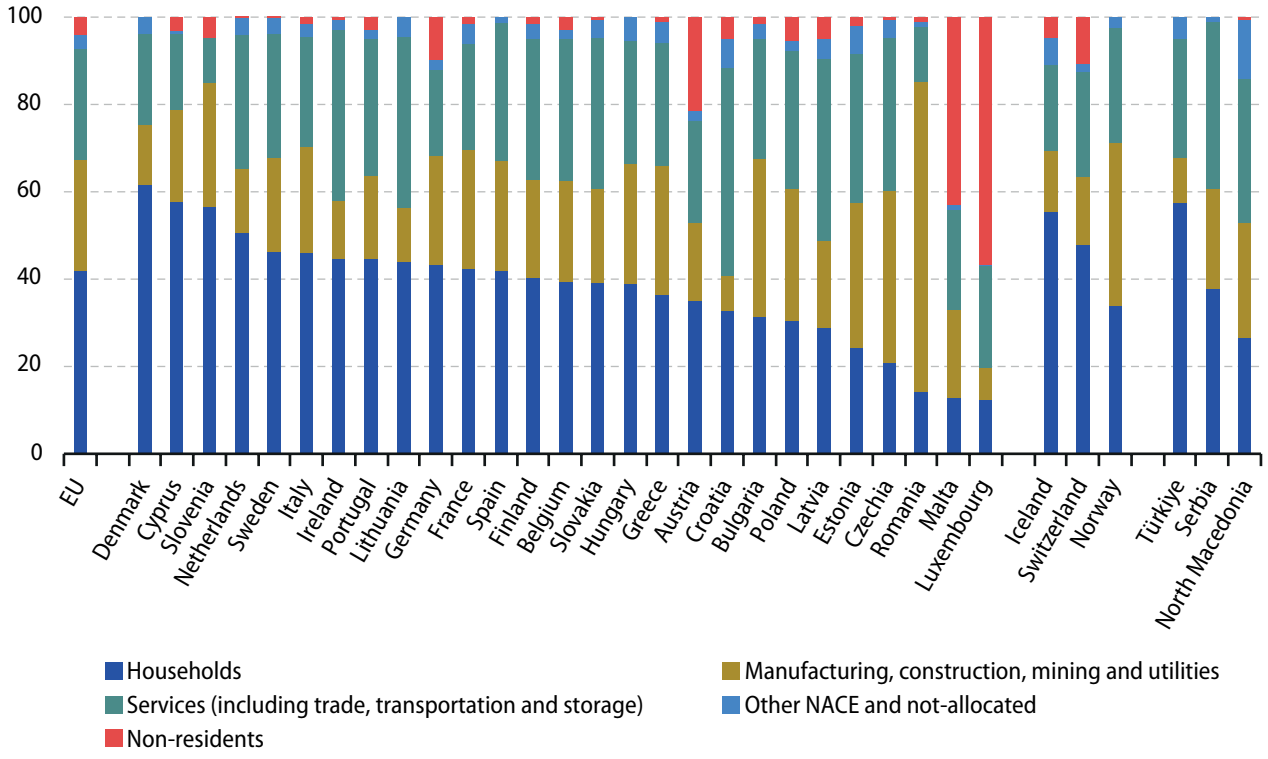
### 5.2.1. Revenue from environmental taxes by paying economic activity and tax category

Presented in the following figure are the energy taxes paid by economic activities across specific Member States and in the EU. Such graphical representation can be developed for each tax category (energy, transport, pollution, and resources). Additionally, illustrations by industrial sub-sector are also possible.

FIGURE 7

## Energy taxes by paying economic activity in European countries

**Energy taxes by economic activity, 2021**
(% of energy tax revenue)



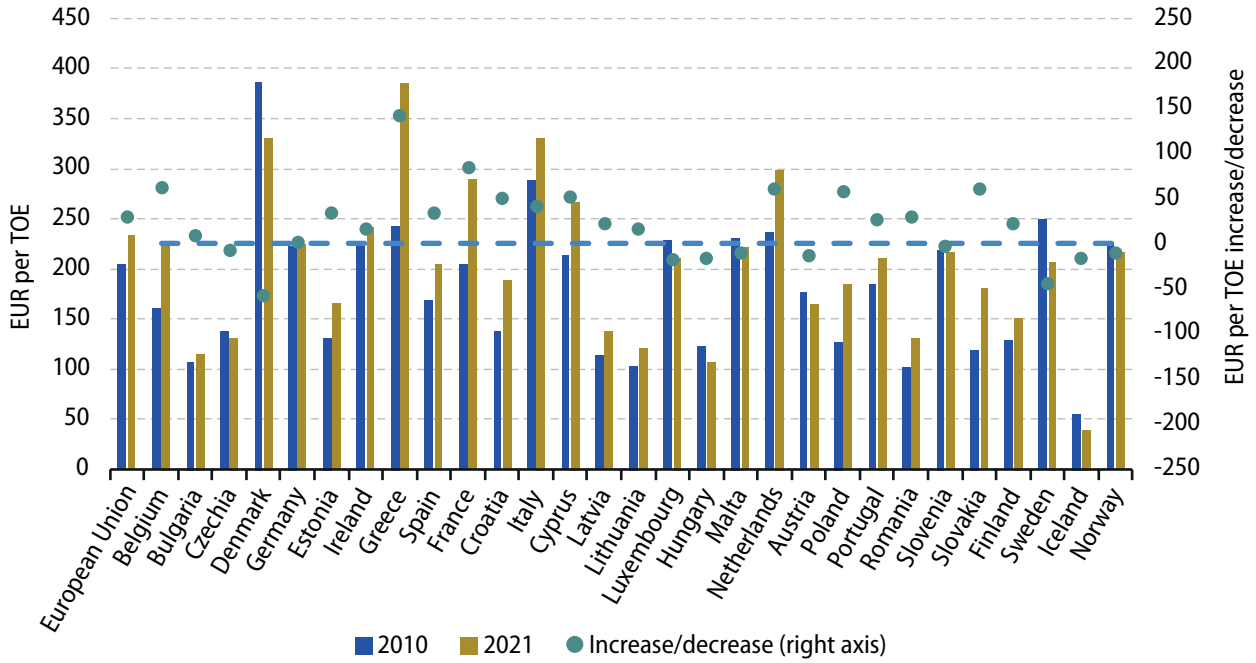

*Source:* Eurostat (online data codes: env_ac_taxind2)

## 5.3. Implicit tax rate (IRT) on energy

The implicit tax rate (ITR) indicator expresses energy tax revenues deflated with the final demand deflator in relation to final energy consumption (euro per tonne of oil equivalent). This indicator provides insight into the relationship between energy tax revenues and final energy consumption calculated for a calendar year. Final energy consumption includes energy consumed in transport, industry, commerce, agriculture, public administration, and households but exclude deliveries to the energy transformation sector and to the energy industries themselves. The different energy products are aggregated on the basis of their net calorific value and expressed in tonnes of oil equivalent.

FIGURE 8

## Implicit tax rate on energy (deflated), 2010 and 2021




*Source:* Eurostat (tsdcc360)

## 5.4. Information about tax bases, tax rates and tax rules and interpretation of indicators

In the pursuit of analysing the effects of environmental taxes, it could be useful to present data on prices and volumes of tax bases as well as the tax rates.

Simple examples of information about tax bases are data about final energy consumption or data about the stock of vehicles or sales of new vehicles.

Information about nominal tax rates for each tax can be presented in a table showing the general tax bases, the specific tax bases, and the tax rates for each specific tax base at a certain point in time.

Information about tax rules (administration, earmarking, tax exemptions, refunds etc.) can be presented with a combination of text and a few small tables.

The shares that total environmental taxes and the four environmental tax categories have in the total revenue from all taxes and social contributions can be seen as indicators for the tax burden on the use of the environment. The evolution over time of these indicators can give information on the tax shift that is part of a green tax reform. A green tax reform implies increasing the share of environmental taxes and reducing the share of taxes on other tax bases, in particular labour.

High or increasing revenue from environmental taxes should not automatically be interpreted as an indicator for the environmental 'friendliness' of fiscal policies. An increase in revenue from environmental taxes may be caused by the introduction of new taxes or by an increase in tax rates, but also by an increase in the tax base, i.e., higher emissions or increased use of products with a negative impact on the environment. In a similar way, a reduction in revenue from environmental taxes may be caused by the impact of policies leading to a reduction in emissions or in the consumption of environmentally harmful products. Lower revenue may also come from changes in classifications of certain payments from taxes to fees, privatisation etc.

Changes in environmental tax revenue as a share of GDP can be explained by several factors, such as the erosion of the nominal value of environmental taxation. Environmental taxes are often levied per unit of physical consumption and fixed in nominal terms, hence, unlike ad valorem taxes which are levied on the value of the goods,

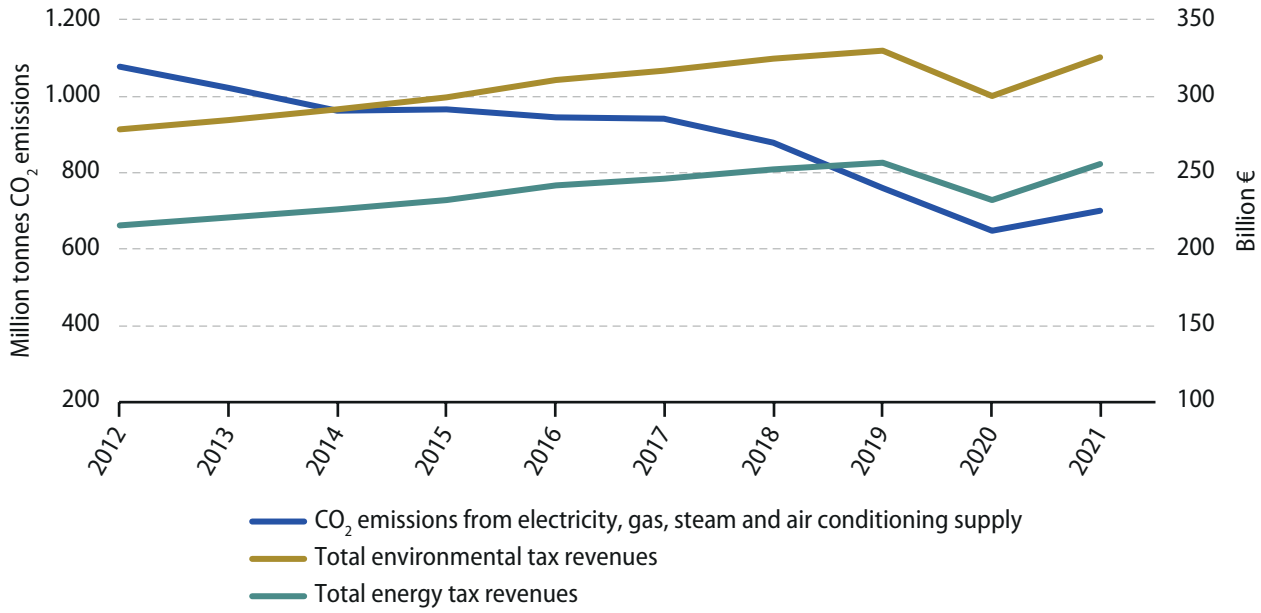
their real value in relation to GDP tends to fall, unless they are adjusted for inflation or otherwise increased at regular intervals.

Comparing total environmental tax revenues, total energy tax revenues with data on $CO_2$ emissions from electricity, gas, steam and air conditioning supply, shows how those timeseries or certain calculated ratios relate over the years. The following figure presents an example for the EU. Electricity, gas, steam, and air conditioning supply was selected for presentation purposes as it is the economic activity associated with the largest GHG emissions. ([41])

It shows that over the period from 2012 to 2021, a pattern emerges as total tax revenue and total energy tax revenue increases (except for the year 2019 possibly due to COVID-19) in tandem with decreasing emissions. While the decrease in $CO_2$ emissions may stem from factors such as carbon leakage, innovation, energy efficiency improvements, etc. and the increase in tax revenue may be attributed to increased auctioning of ETS permits or increased used of environmental bases that are less carbon intensive, this pattern could offer insights into the role of taxation policies on contributing to the reduction of $CO_2$ emissions from the presented NACE category.

**FIGURE 9**

## Comparison of total environmental tax revenues, total energy tax revenues and $CO_2$ emissions from electricity, gas, steam, and air conditioning supply, EU 2012-2021




*Source:* Eurostat (online data code: env_ac_tax)

([41]) See the Statistics explained article on Greenhouse gas emissions by economic activity 2008-2021

# 6

# Outlook and future developments

During the process of updating the handbook, important inputs and proposals were provided by several key stakeholders, encompassing various comments. Several of these observations warrant comprehensive deliberation and consideration. However, it is important to underline that the present update primarily focuses on integrating enhancements within the existing framework rather than effectuating changes in the methodology; any significant methodological improvements will be earmarked for future iterations, with more profound revisions planned for subsequent revisions of the handbook.

This section therefore presents aspects obtained through consultations with key stakeholders that are yet to be addressed in the ETEA handbook and the underlying rationale for such omissions. It serves as a channel through which feedback and future possibilities are incorporated and underlines the potential necessity for further methodological discussions and updates during a more extensive update of the ETEA handbook.

In this context, the following aspects have been identified as important elements to integrate into the ETEA handbook, but are planned for future updates of it:

- **Tax revenue from emission permits under cap-and-trade schemes:** Inclusion of the treatment of emission permits in the context of the revision of the 2008 SNA for adoption by the Commission in 2025. This has not been included in the current revision of the handbook as the revision of the 2008 SNA is going through research and consultations. ([42]) One important research item on the SNA agenda is a re-examination of the treatment and recording of emissions trading schemes in the national accounts addressed by the Wellbeing and Sustainability Task Team (WSTT). ([43])
- **Proxies of a physical unit:** Examples of cases for which it is not straightforward according to the criteria in the handbook to decide whether a tax is an environmental tax when its tax base is not (yet) in the list of environmental taxes. The reporting of such complex cases by countries, along with their reasoning for inclusion or exclusion from the category of environmental taxes.
- **Taxes in the ESA and SNA:** Examples of borderline cases between taxes and other transactions in the national accounts. Including experiences of countries reporting data on fees, charges, or payments in the handbook.
- **Allocating environmental tax revenues to paying economic activities:** Examples of cases where environmental accounts contribute to national accounts estimates for the products/economic activities within the scope of environmental accounts.
- **Taxes paid by non-residents:** Incorporate in the handbook guidance and examples on how to solve cases where the distinction between residents and non-residents is not clear-cut, including experiences from countries on how they addressed this.
- **Comparability across countries:** Section explaining the existent issues on comparability among countries.
- **Information on consistency of accounts:** Incorporation of information on the consistency of accounts and provide recommendations to use the data considering the differences among countries.

([42]) https://unstats.un.org/unsd/nationalaccount/Towards2025.asp

([43]) WS.7 Treatment of Emission Trading Schemes

- **Presentation and interpretation of data – tables and indicators:** Incorporate additional indicators to assess the evolution of environmental tax statistics among the EU Member States.
- **Inclusion of memo items:** The current manual excludes certain tax revenues, such as those from oil and gas extraction taxes or all land taxes. To prevent the exclusion of important information from reported accounts, which could adversely affect their utility for policymaking, it is recommended to collect such data using 'memo items'. These memo items do not alter the ETEA of a country. Furthermore, they contribute to enhancing the overall understanding of the fiscal landscape. It is important to note that by including memo items, the list of tax bases will be affected. Examples of these memorandum items are:
  - Environmental taxes for national purposes (difference between total reported in ETEA and total published for national purposes).
  - Other environmentally related payments to government (fees and charges).
  - Certain land taxes, e.g., land conversion taxes (e.g., from forest to agricultural land use), taxes on land or soil characteristics of environmental relevance (e.g., $m^2$ of soil sealing, soil quality), taxes on certain land uses (e.g., intensive agriculture and forestry, etc.).
  - Taxes on oil and natural gas extraction.
  - Profit taxes related to the resource rent (e.g., from mining, fisheries).
  - Elevated VAT on environmentally related tax bases.
- **Introduction of NACE Update 1 (NACE Rev. 2.1):** The Commission Delegated Regulation (EU) 2023/137 of 10 October 2022 amending Regulation (EC) No 1893/2006 of the European Parliament and of the Council establishing the statistical classification of economic activities NACE Revision 2 (Text with EEA relevance) (C/2022/7104, OJ L 19, 20.1.2023, p. 5–42) introduces an updated version of NACE Revision 2 (Update 1). This Regulation will apply to the data transmissions to the Commission (Eurostat) relating to each reference period from 1 January 2025; by way of derogation this regulation shall apply to the data transmissions for Regulation (EU) No 691/2011 of the European Parliament and of the Council, as regards 'Annex II – Module for environmentally related taxes by economic activity', relating to each reference period from 1 January 2028. Accordingly, the first reference year where NACE 2.1 will be used for environmental taxes is 2026, i.e., in the data collection ETEA 2028.

# 7 Annex

## Annex. A*64 aggregation level as in Commission Regulation (EU) No 715/2010 ([44])

| Seq. No | NACE Rev. 2 divisions | Description |
|---|---|---|
| 1 | 1 | Crop and animal production, hunting and related service activities |
| 2 | 2 | Forestry and logging |
| 3 | 3 | Fishing and aquaculture |
| 4 | 05-09 | Mining and quarrying |
| 5 | 10-12 | Manufacture of food products, beverages and tobacco products |
| 6 | 13-15 | Manufacture of textiles, wearing apparel and leather products |
| 7 | 16 | Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials |
| 8 | 17 | Manufacture of paper and paper products |
| 9 | 18 | Printing and reproduction of recorded media |
| 10 | 19 | Manufacture of coke and refined petroleum products |
| 11 | 20 | Manufacture of chemicals and chemical products |
| 12 | 21 | Manufacture of basic pharmaceutical products and pharmaceutical preparations |
| 13 | 22 | Manufacture of rubber and plastic products |
| 14 | 23 | Manufacture of other non-metallic mineral products |
| 15 | 24 | Manufacture of basic metals |
| 16 | 25 | Manufacture of fabricated metal products, except machinery and equipment |
| 17 | 26 | Manufacture of computer, electronic and optical products |
| 18 | 27 | Manufacture of electrical equipment |
| 19 | 28 | Manufacture of machinery and equipment n.e.c. |

([44]) http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:210:0001:0021:EN:PDF

| Seq. No | NACE Rev. 2 divisions | Description |
|---|---|---|
| **20** | 29 | Manufacture of motor vehicles, trailers and semi-trailers |
| **21** | 30 | Manufacture of other transport equipment |
| **22** | 31-32 | Manufacture of furniture; other manufacturing |
| **23** | 33 | Repair and installation of machinery and equipment |
| **24** | 35 | Electricity, gas, steam and air conditioning supply |
| **25** | 36 | Water collection, treatment and supply |
| **26** | 37-39 | Sewerage; waste collection, treatment and disposal activities; materials recovery; remediation activities and other waste management services |
| **27** | 41-43 | Construction |
| **28** | 45 | Wholesale and retail trade and repair of motor vehicles and motorcycles |
| **29** | 46 | Wholesale trade, except of motor vehicles and motorcycles |
| **30** | 47 | Retail trade, except of motor vehicles and motorcycles |
| **31** | 49 | Land transport and transport via pipelines |
| **32** | 50 | Water transport |
| **33** | 51 | Air transport |
| **34** | 52 | Warehousing and support activities for transportation |
| **35** | 53 | Postal and courier activities |
| **36** | 55-56 | Accommodation; food and beverage service activities |
| **37** | 58 | Publishing activities |
| **38** | 59-60 | Motion picture, video and television programme production, sound recording and music publishing activities; programming and broadcasting activities |
| **39** | 61 | Telecommunications |
| **40** | 62-63 | Computer programming, consultancy and related activities; information service activities |
| **41** | 64 | Financial service activities, except insurance and pension funding |
| **42** | 65 | Insurance, reinsurance and pension funding, except compulsory social security |
| **43** | 66 | Activities auxiliary to financial services and insurance activities |
| **44** | 68 | Real estate activities |
| **44a** | | of which: imputed rents of owner-occupied dwellings |
| **45** | 69-70 | Legal and accounting activities; activities of head offices; management consultancy activities |
| **46** | 71 | Architectural and engineering activities; technical testing and analysis |
| **47** | 72 | Scientific research and development |
| **48** | 73 | Advertising and market research |
| **49** | 74-75 | Other professional, scientific and technical activities; veterinary activities |
| **50** | 77 | Rental and leasing activities |
| **51** | 78 | Employment activities |
| **52** | 79 | Travel agency, tour operator reservation service and related activities |
| **53** | 80-82 | Security and investigation activities; services to buildings and landscape activities; office administrative, office support and other business support activities |

| Seq. No | NACE Rev. 2 divisions | Description |
|---|---|---|
| **54** | 84 | Public administration and defence; compulsory social security |
| **55** | 85 | Education |
| **56** | 86 | Human health activities |
| **57** | 87-88 | Social work activities |
| **58** | 90-92 | Creative, arts and entertainment activities; libraries, archives, museums and other cultural activities; gambling and betting activities |
| **59** | 93 | Sports activities and amusement and recreation activities |
| **60** | 94 | Activities of membership organisations |
| **61** | 95 | Repair of computers and personal and household goods |
| **62** | 96 | Other personal service activities |
| **63** | 97-98 | Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use |
| **64** | 99 | Activities of extraterritorial organisations and bodies |

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# Environmental taxes – A statistical guide

To address environmental problems, profound changes to existing production and consumption patterns are needed. These changes can involve substantial economic costs.

The search for instruments capable of producing behavioural changes across all sectors at minimal cost makes policy-makers pay closer attention to market based instruments.

Therefore, market based instruments for pollution control and natural resource management are an increasingly important part of environmental policy tools in the European Union

and there is considerable interest in their use and effectiveness.
This statistical guide focuses on the development of statistics on environmentally related taxes, as this is an area where basic data is generally readily available and comparable across countries.

Both national compilers and interested data users may benefit from this publication as a source of background information and clarification.

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