Developments in Accounting for Environmental Expenditure

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Abstract

In order to build a sustainable economic society with a low environmental impact, the private sector and the general government must identify and implement active or voluntary tools capable of influencing the carrying out of the socio-economic activities as to ensure their sustainability. Highlighting the economic phenomena and manner of operation of their in economics is achieved by high synthesis indicators produced by national accounting.

Responding to these demands, the UN Statistics Division, together with Eurostat and national statistical offices have initiated a diversification of statistical tools for creating of the indicators which extend the statistics beyond the GDP .

An explicit requirement to address environmental economic accounts at European level is expressed by the European statistical program developed and monitored by Eurostat. Within this legal framework program was created to collect data on environmental accounts by Regulation no. 691 of the European Parliament and of the Council of 6 July 2011 on European environmental economic accounts and updated by Regulation no. 538/2014 of the European Parliament and of the Council of April 2014.

In this category of accounts includes environmental expenditure account (EPEA), focusing, in particular, highlighting what is and how environmental activities are carried out.

This article presents experimental estimates of environmental protection expenditure in Romania from 2008 to 2011.

In the first part of the article presents several conceptual issues of satellite account of environmental expenditures, respective: objectives and options that responds account of environmental expenditures, classification of environmental activities and classification of the units engaged in these activities. It also shows the EPEA model for Romania.

In the second part of the article presents several examples of applications the EPEA at European and national level

Key words: *environmental accountancy approach, national environmental accountancy, satellite accounts of environment protection, environmental activities, production of the service environment, national expenditure for environmental protection, financing environmental expenditures*

1. Introduction

Highlighting the economic phenomena and manner of operation of their in economics is achieved by high synthesis indicators produced by national accounting. One such indicator is the Gross Domestic Product, which measures the flow of goods and services in the economy and is often cited as a measure of economic well-being of our society.

However, many aspects of welfare can not be quantified only with GDP and although there is a correlation between GDP and the welfare, this indicator as actual form can not express the real content of welfare, which besides the link with the economic growth has multi-link with the consumption of the state of environment, etc.

It is a reality, the need to improve data and indicators to complement GDP to express progress in all directions that contribute to welfare (the healthy, environmental protection, production and consumption patterns, etc.). Briefly, an accounting framework is required which integrate environmental issues with economic ones.

This issue was on the bench of the High Level Conference "Beyond GDP", organized by the European Commission (together with the European Parliament, the Club of Rome UNECE and OECD), in November 2007. Conference held some directions for building statistical tools necessary to achieve integrated indicators "economy-environment" also manifested strong support from policy makers, experts and civil society to implement them.

Responding to these demands, the UN Statistics Division, together with Eurostat and national statistical offices have initiated a diversification of statistical tools for creating of the indicators which extend the statistics beyond the GDP . These initiatives can be mentioned:

- extending National Accounts to environmental issues (ex. environmental -economics accounts, satellite accounts, etc.);

- development of indicators (ex. the structural indicators, the sustainability indicators, decoupling indicators), reflecting the new political and technical context;

- construction of composite indicators on the environment, quality of life and the welfare (ex. the sustainable development index, the human development index, the ecological footprint);

Currently there are several statistical offices and international organizations that engender the information in this area, but there is a lack of integration of statistics showing an interrelation with the development environment and social status.Within these concerns there are several proposals to change the system of national accounts (SNA) so as to take account of environmental factors. The proposals are intended primarily to adjustment operations, flows and stocks of SNA to include environmental elements.

The most significant example of these concerns is the system integrated environmental-economic accounting (SEEA - System of Integrated Environmental and Economic Accounting) developed by the United Nations Statistics Division.

An explicit requirement to address environmental economic accounts at European level is expressed by the European statistical program developed and monitored by Eurostat. Within this legal framework program was created to collect data on environmental accounts by Regulation no. 691 of the European Parliament and of the Council of 6 July 2011 on European environmental economic accounts and updated by Regulation no. 538/2014 of the European Parliament and of the Council of April 2014.

Regulation establishes a common framework for the collection, compilation, transmission and evaluation of environmental economic data in order to create satellite accounts to national accounts, providing methodology, common standards, definitions, classifications and accounting rules and statistics to be used to compile these accounts.

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According to the regulation in the first stage (2014 - 2016) will be implemented:

- air emissions accounts;
- account of environmental taxes;
- material flow accounts of the economic scale.

For the second stage, after 2016 is under implementation other three accounts:

- account for environmental expenditure;

- account of environmental goods and services sector (environmental industry);
- energy flows account;

2. Satellite account of environmental expenditures

2.1 Objectives and options that responds account of environmental expenditures

An important component of integrated accounting "economy-environment" is the record of transactions concerning environmental protection economic units in monetary terms. In this category of transactions include: expenditure for environmental preservation and environmental protection, environmental taxes, subsidies and rents for the extraction of natural resources, production of goods and environmental services.

Many of the transactions and flows of economic activities related to environmental concern are recorded in the national accounts, but some of them can not be identified due to the structure of accounts and types of classifications they use. For the latter constructed environmental economic accounts as satellite accounts to national accounts. In this category of accounts includes environmental expenditure account (EPEA), focusing, in particular, highlighting what is and how environmental activities are carried out, allowing answers to the following questions:

- what are the costs of activities of environmental protection?
- by whom and how they made this activity?
- who really bears the financial consequences?

All features related to the organization of data in developing EPEA lead to the idea that such an account can be viewed as a complement to the central framework of national accounts, following the precepts of the description of the function of satellite accounts 'environmental protection' in a manner which takes account of national accounts conventions.

EPEA contains a set of four interrelated tables that describe:

- production of the service environment and the way in which they are produced (Table B)
- national expenditure for environmental protection: to use (consumer) services, related products and products adapted to gross capital formation (investment) and other transactions related to environmental protection (transfers) (Table A)
- table built on the supply / use of environmental services (Table B1)

- financing environmental expenditures (Table C)

2.2 Environmental activities, environmental services and producers

Characterization of environmental actions requires, on the one hand, highlighting the activities of economic agents, leading to the elimination of pollution, means that they performed these activities, and the effort made in this direction, on the other hand used more natural resources efficiently.

Environmental activities are those activities whose primary purpose is to prevent, reduce and eliminate pollution and other forms of environmental degradation. Delimitation of environmental activities is based on the elements of the environment, nature or consequences of pollution they generate and techniques used.

Combining types of activities can obtain a formal framework for classification:

a) activities to prevent and combat the impact of production and consumption systems, which by their nature to limit the adverse effects of economic activities which, in turn, can be divided as follows:

- water protection -includes all activities and measures taken to prevent pollution of surface water, collection and treatment of wastewater, including monitoring.
- air protection - these specific activities consist of measures fated at reducing production and reducing pollutant emissions and concentrations of pollutants in the atmosphere.
- waste management - refers to any activity whose purpose is the collection, transport, recovery, treatment and disposal.
- protection of soil and groundwater - is defined as an activity involving environmental operation and maintenance of facilities for the decontamination of polluted soil and groundwater clean.
- reducing noise and vibration - refers to any activity undertaken for reduce noise and vibration in order to protect people and buildings.
- protection of biodiversity - include: conservation of fauna and flora, preventing natural ecological accident (maintaining natural factors), land protected natural areas, actions to restore landscapes, protecting and restoring natural sites.
- other activities, such as: research – development, general environmental management, training.

b) resource management activities aimed at preserving and maintaining stocks of natural resources.

In turn these activities include: mineral and energy resource management , the reduction of extraction of natural resources (including the recovery, reuse, recycling and substitution of natural resources) and recovery of natural resources, management of forest resources, management of aquatic resources, water management , research and development for natural resource management , other resources management activities (ex. monitoring, control and surveillance).

Based on the definitions of environmental activities can define environmental goods and services, which include the specific services as a result of the activities of environmental protection, related products and products adapted.

Environmental services are a result of specific environmental activities, executed as activities: primary, secondary or auxiliary by operators or units of government. By definition, specific environmental activities produce only specific services. However, there are economic activities that can generate production of goods whose use serves the goals of environmental protection, although not specific activities.

These can be used for final consumption or intermediate or gross capital formation. Such products are called related products (ex. catalytic converters for air protection, septic tanks, biological products for septic tanks to reduce soil pollution, bags, bins, waste containers, enclosures to reduce noise). Besides the related products are adapted products. These, though not the result of specific activities through their consumption less pollution occurs before the equivalent products (ex. Desulfurization fuel, unleaded gasoline, etc.).

2.3 Classification of the units involved in environmental activities

Establishments producing environmental services are the businesses that have been engaged in environmental protection as a main activity or as a secondary activity to the main economic activity other than the environment. Also, establishments and units are considered performing an economic activity primary or secondary pollutant and therefore must conduct an internal work environment necessary to limit the negative effects of their own economic activities.

Typology of classifications is done by borrowing from national accounts, as follows:

- Government sector: includes all institutional units which produce non-market services environment, for community or subsidizing them. Government sector is divided into two subsectors: the central government comprises state administration bodies and central bodies whose powers are extended throughout the country and local government comprising all government units whose powers to local administrative levels.
- Productive sector ("Company") comprises institutional units that produce environmental services, grouped as follows: specialized producers representing those units which have as main activity object of environmental protection and are included in NACE Rev. 2 divisions: 37 "collection and wastewater treatment", 38 "Collection, treatment and disposal, 39 "decontamination activities and services" and non-specialized producers representing those units whose main activities other than the environment, but are obliged to perform a secondary or auxiliary activities of environmental protection to prevent possible harm to the environment. These units can be found in CAEN Rev.2: 02 "Forestry and logging" , 05-09 "extractive industry", 10-33 "manufacturing" 35 "production, supply of electricity and heat , gas, steam and air conditioning ", 36" abstraction,purification and distribution of water", 41-43" Construction " and 49-51" Shipping.
- Household sector includes those environmental activities conducted on their own population is mainly reflected in final consumption.

2.4. Construction of the Romanian EPEA

EPEA has a set of four tables describing interrelated:
- production of the service environment, and how they are produced (Table B)
- national expenditure for environmental protection: to use (consumer) services, related products and products adapted to gross capital formation (investment) and other transactions related to environmental protection (transfers) (Table A)
- table built on the supply / use of environmental services (Table B1)
- financing environmental expenditures (Table C)

Table 1 - The set of EPEA tables

Table A Uses (expenditure)	Table B Production	Table B1 Supply-use	Table C Financing of expenditure
Uses of EP services by resident units	Output of EP services	From output to uses: introduction of imports/ exports and taxes/subsidies on production	Financing of: -uses of EP services -Gross capital plus land acquisition -uses of adapted &connected products -specific transfers
Uses of adapted & connected products			
Gross capital formation plus land acquisition	Gross capital formation plus land acquisition		
Specific transfers			

Source :Eurostat 2002

Table B Production of EP services

Table B describes the production of EP services by domestic producers. Different categories of producers and output may be distinguished. The two main categories are:

- Specialized producers (with corresponding market and non-market output),
- Non-specialized producers (with corresponding secondary and ancillary outputs).

For the government we established separate production tables for each level of government. There is a table for the central level, one for the local authorities.

Table 2 Production of EP services (Table B)

	Producers				Total
	Specialized producers		Non-specialized producers		
	government	NACE 37, 38, 39	Secondary	Ancillary	
1.1 Current uses					
1.1.1 Intermediate consumption					

	Producers				Total
	Specialized producers		Non-specialized producers		
	government	NACE 37, 38, 39	Secondary	Ancillary	
1.1.2 Compensation of employees					
1.1.3 Consumption of fixed capital					
1.1.4 Other taxes on production					
1.1.5 Less other subsidies on production					
1.1.6 Net operating surplus					
1.2. Output (cost of production)					
1.2.1 Non-environmental output					
1.2.2 Environmental protection output					
1.2.2.1 Non-market					
1.2.2.2 Market					
1.3 Current EP resources					
1.3.1 Market output					
1.3.2 Current transfers					
2. Capital transactions					
2.1.Gross Fixed Capital Formation					
2.2. Other capital uses					
2.3 Investment grants received					
2.4 Other capital transfers received					
3 Financing by producers					

Source: Eurostat 2002

All values in Table B are measured in a manner consistent with the accounting conventions of national accounting.

Table B1 Supply and uses

Table B1 permits the transition from total supply to uses. The main purpose of the table is to distribute the supply of market EP services among uses (how the service is used) by final consumption, intermediate consumption and capital formation.

Table 3: Table B1 Supply and uses of environmental protection

	Production			Total
	market production	**non-market production**	**ancillary**	
1. Uses of resident units				
1.1 Intermediate consumption				
1.1.1 of which by specialized and secondary producers				
1.1.2 of which by non-specialised producers				
1.2 Final consumption				
1.3 Gross capital formation (land improvement)				
2. Exports				
Total uses (1+2) = total supply (3+4+5+6)				
3. Output (basic prices)				
4. Imports (customs price)				
5. Non-deductible VAT				
6. Other taxes on products (if any)				
7. Subsidies on products (if any)				
Total supply (3+4+5+6-7)				

Source: Eurostat 2002

The final consumption means household and government activities and intermediate consumption refers to industries; capital formation mainly relates to the purchase of EP services for land improvement. Table B1 also describes the origin of the products, i.e. if the products have been manufactured domestically or if they've been imported for use.

Table A National expenditure for environmental protection

Table A describes the use of environmental services and gross capital formation for environmental services by categories of users.

The components of national expenditure consist in:

- uses of EP services (final consumption, intermediate consumption) by categories of users
- gross capital formation for EP activities
- use of connected and adapted products (final consumption, intermediate consumption)
- specific transfers for environmental protection

Table 4: National expenditure by component and by user/beneficiary (Table A)

Components	Users						
	Specialized products		Other products		Consumers		RWS
	Govern -ment	NACE 37, 38, 39	non-specializ.	Secon -dary	Govern -ment	House -holds	
1 Uses of EP services							
1.1 Final consumption							
-market							
-non-market							
1.2 Intermediate consumption							
market							
-ancillary							
2 Uses of adapted & connected products							
2.1 Final consumption							
2.2 Intermediate consumption							
3. Gross Capital formation for EP							
4 Specific transfers							

Components	Users						
	Specialized products		Other products		Consumers		RWS
	Govern -ment	NACE 37, 38, 39	non-specializ.	Secon -dary	Govern -ment	House -holds	
4.1 Subsidies on production							
4.2 Other specific transfers							
5 Total uses of resident units (1+2+3+4)							
6 Financed by the rest of the world							
7 National expenditure for EP(5-6)							

Source: Eurostat 2002

Much of the data is completed in Table A are from Tables B and B1. This refers to the use of environmental services and related products and product uses adapted.

Table C Financing of national expenditure for environmental protection

Table C describes the financing of national expenditure for environmental protection for each category of users / beneficiaries. This table is necessary because environmental financing flows different execution flows of expenditure by the fact that in addition to funding its own costs of the users are involved government transfers (investment grants, subsidies, etc.), financing the rest of the world (eg . European Union) or specific environmental taxes.

Table 5 Financing of national expenditure for environmental protection
Table C Million lei Current prices

FINANCING UNITS	Producers			Consumers		RWS	Total
	General Gov.	Speci a-lized	Non specializ.	General Gov.	House -holds		
General Gov. (GG)							
Central Gov. (CG)							

FINANCING UNITS	Producers			Consumers		RWS	Total
	General Gov.	Speci a-lized	Non specializ.	General Gov.	House -holds		
Local Gov. (LG)							
NPISHs							
Corporations							
Specialized producers							
Other producers							
Households							
National Expenditure							

Source: Eurostat 2002

2.5 The indicators EPEA

For statistical analysis - economic defines three categories of indicators which try to characterize environmental value, structure, time evolution and relationship to other economic activities:

- indicators that highlight national environmental expenditure components;
- indicators that describe the operations of producers of environmental services
- indicators that describe the funding of national expenditure for environmental protection (resource indicators)

National expenditure for environmental protection

Depending on specific operations executed national expenditure for environmental protection are structured as follows:

- final consumption of specific environmental services, representing household final consumption (final consumption of specific services trade) and collective consumption of government. Final consumption of specific services of the population is given the services purchased by households in the market (ex. collecting waste, sewage, etc.). Specific collective consumption of government represent those services that are not sold on the market and benefiting all institutional sectors, without being able to determine the value of each service rendered (ex. cleaning streets, street waste collection, etc.);
- intermediate consumption of environmental services specific to productive units;

- capital expenditures are government spending and specialized producers for gross fixed capital formation and the total investments related to environmental protection to non-specialized producers

- specific transfers consisting of subsidies on the production of specific services to producers of specialized services, or the compensation for loss of income due to environmental activities and production subsidies to non-specialized producers

Production of specific environmental services

Environmental service production is the result of specific activities carried out under the control and responsibility of a producer who uses labor, capital, goods and services for the production of specific services

Production of environmental services could calculated by the type of producer:

- specialized producers whose main activity is a specific activity

- non specialized producers performing a specific activity as a secondary or ancillary activity to their main activity, unrelated to the environment

When the work environment is executed as principal or secondary activity, production can be commercial or noncommercial.

Commercial production is for market or services covered by the sale and purchase products on the market. Noncommercial production is a service that is not sold on the market and includes: household services and collective services (services provided to the community or particular groups of households free or quasi-free).

In general, when the activity is ancillary the production is non-commercial.

Commercial production is valued at basic prices and noncommercial production at costs (sum of intermediate consumption, wages and consumption of fixed capital).

Financing of national expenditure for environmental protection

Environmental activities are characterized by a complex circuit of funding due to the existence of current and capital transfers, which are financed from general budgetary resources or specific duties. In this regard, the unit consumes specific service or environmental investing is not always funding unit.

For each component of national expenditure is identified unit which provides funding and funding source, namely:

- The value of services funded by the users;
- The value of services funded by the government;
- The value of services provided by the non specialized producer;
- The value of fixed capital expenditure financed by producers

Funding of each component of national expenditure must be reflected in correspondence with the institutional sectors used in the national accounts, namely:

a) expenditure funded by government, broken into three categories:
- collective consumption of non-specific services;
- gross capital formation of the government units;
- current and capital transfers (subsidies, investment aid, etc.) made by government units;

b) expenditure financed by the productive sector, which they can drill down into three categories:
- the gross capital formation (the part that is not financed through investment aid and other capital transfers);
- intermediate consumption of ancillary activities of the non-specialized producers;
- transfers paid (ex. paying fees for environmental protection);

c) expenditure financed by the population also can be broken down into three categories:
- individual l consumption of environmental services;
- investment (ex. septic tanks, protective windows noise etc.);
- payment of fees for environmental protection.

2.6 The main sources of data

To complete the EPEA tables using data from existing statistical research (environmental statistics, production statistics, financial statistics) or the national accounts:

- Statistical survey "Environmental expenditure " which contains a good deal of information necessary for completing Schedule B – "production of environmental services";
- Statistical research on industrial products and services (survey PRODROM) and business surveys;
- Data from national accounts: production and income generation in the public administration (Table 11 -S1311 and S1313- ESA transmission program) and input-output tables (Tables 15 and 16 of the ESA transmission program).

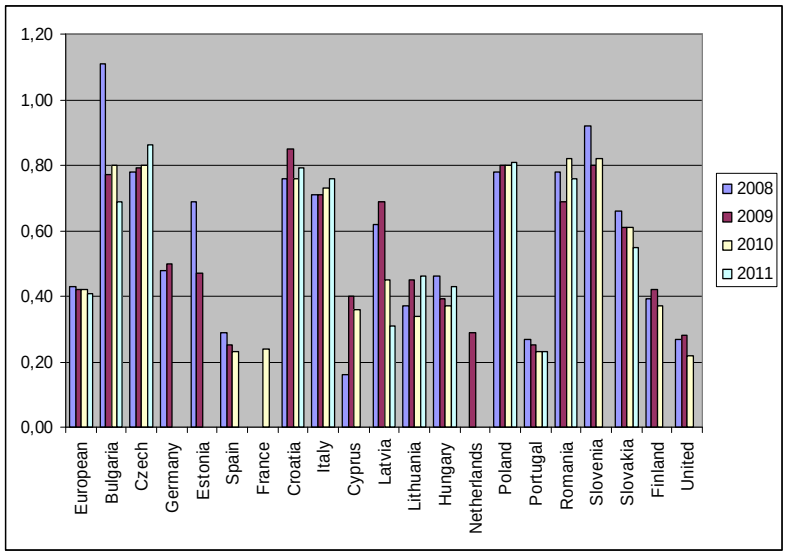
3. Application of environmental protection expenditure account

3.1 European level

EPEA is a tool for monitoring environmental policy at the European level. The main objective is to assess the environmental economic resources in Member States. For international comparisons of national environmental expenditure reports from various summary indicators, and outcome of these reports lead to global or individual decisions to the Commission. Whereas the GDP is the main indicator of synthesis used in international comparisons, in the analysis of environmental protection at European level is calculated the share of environmental expenditure in GDP.

Figure 1 Share of environmental expenditure in the industry in GDP, in some Member States

(%)



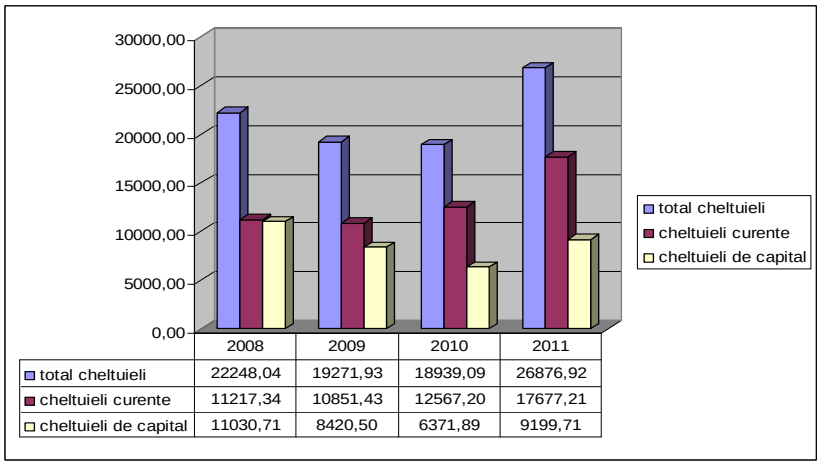
3.2 National level

EPEA provides a systematic and comprehensive framework for describing and analyzing, on the one hand flows environmental expenditure and on the other financial flows in the national economy. In terms of the expenditures for environmental protection, very useful for policy analysts is to analyze the various components of expenditure on environmental areas and changes over time that occur at this level. Key indicators for analysis are on the one hand, national expenditure made by category of expenditure

and by category of producers, the areas of the environment, and secondly financing of the expenses by donor units on the other financing expenses by financing units.

Figure 2 Structure of expenditures for environmental protection according to categories of expenditure from 2008 to 2011

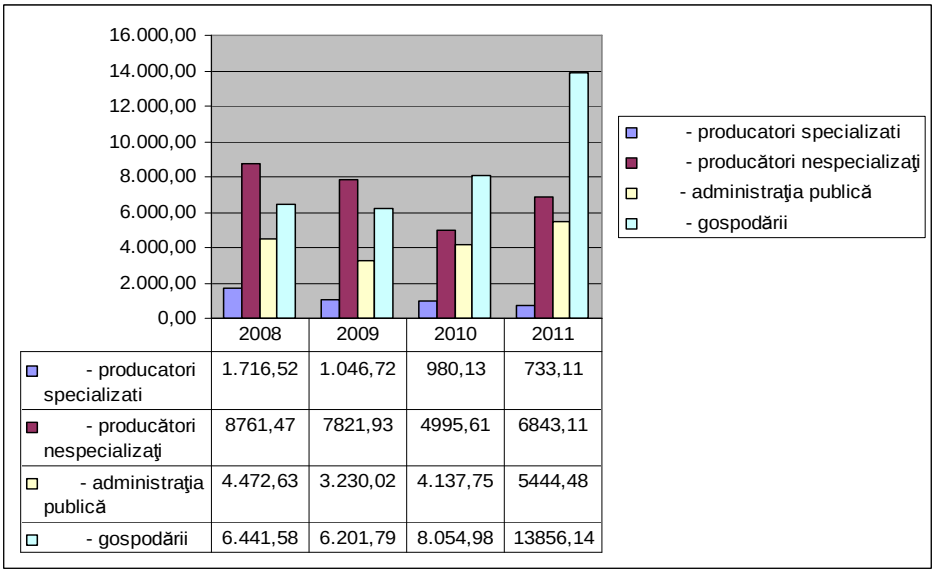
million current prices



	2008	2009	2010	2011
total cheltuieli	22248,04	19271,93	18939,09	26876,92
cheltuieli curente	11217,34	10851,43	12567,20	17677,21
cheltuieli de capital	11030,71	8420,50	6371,89	9199,71

Figure 3 Structure of expenditures for environmental protection according to the categories of producers from 2008 to 2011

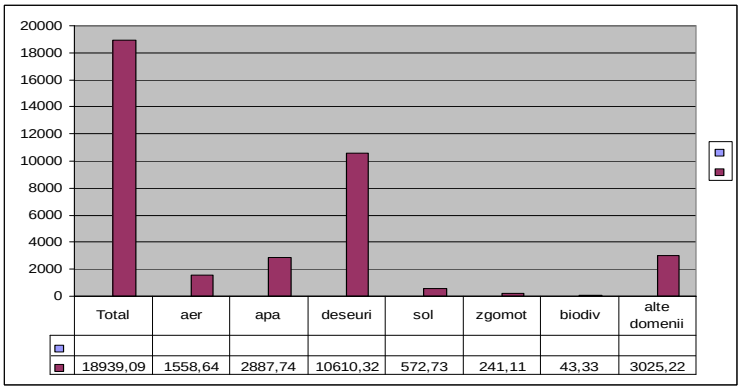
million current prices



	2008	2009	2010	2011
- producatori specializati	1.716,52	1.046,72	980,13	733,11
- producători nespecializaţi	8761,47	7821,93	4995,61	6843,11
- administraţia publică	4.472,63	3.230,02	4.137,75	5444,48
- gospodării	6.441,58	6.201,79	8.054,98	13856,14

Figure 4 Expenditures for environmental protection environmental areas in 2011

million current prices



To analyze the environmental efforts made at the national level in line with economic growth efforts can make a link between data protection expenditure and economic data synthesis in the national economy. This link is possible because EPEA indicators are built on the same principles of national accounts indicators so that they can be computed as a statistical indicator of intensity ratio between the two categories. These indices are calculated both at national and representative institutional sectors, namely: government, corporations, households

Figure 5 Share of expenditures for environmental protection in GDP

(%)

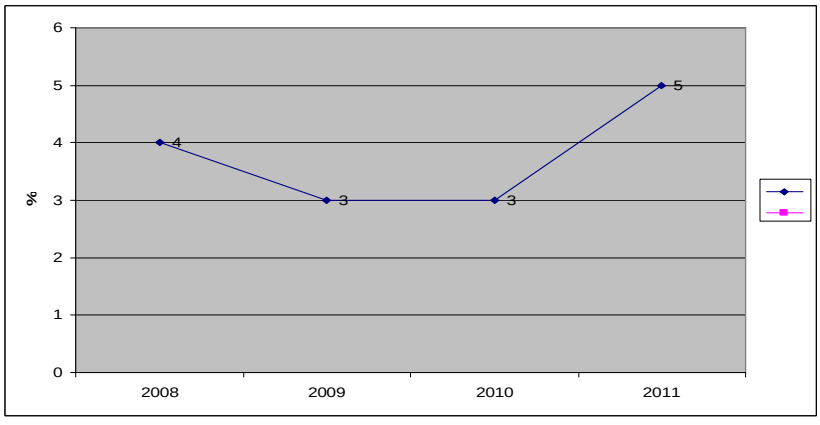
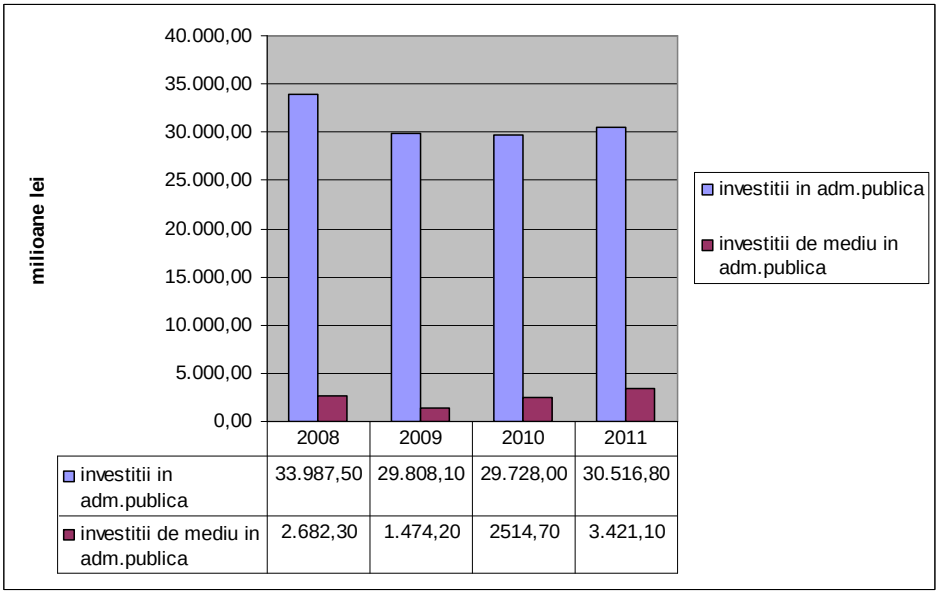
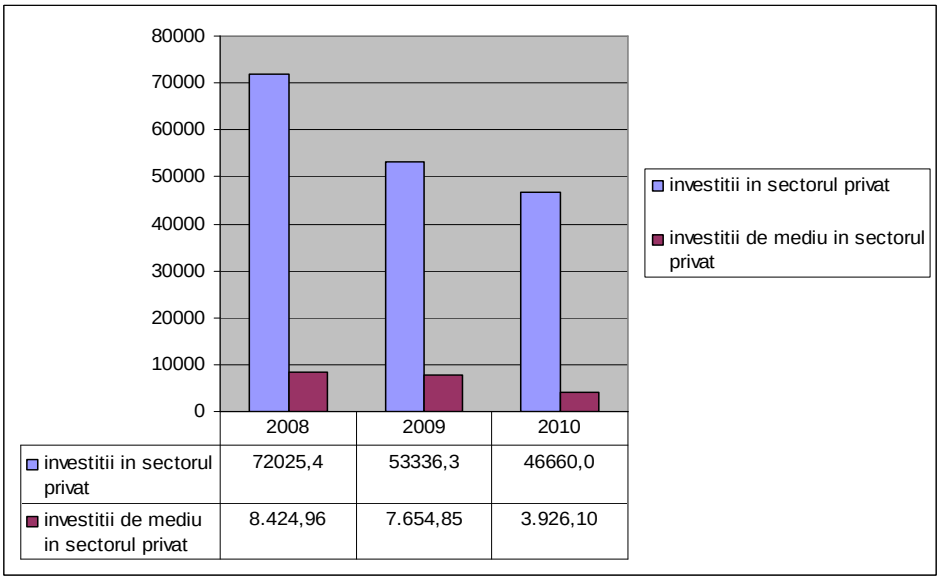


Figure 6 Environmental investments in Public Administration from 2008 to 2011



	2008	2009	2010	2011
investitii in adm.publica	33.987,50	29.808,10	29.728,00	30.516,80
investitii de mediu in adm.publica	2.682,30	1.474,20	2514,70	3.421,10

Figure 7 Investment environment in the private sector



	2008	2009	2010
investitii in sectorul privat	72025,4	53336,3	46660,0
investitii de mediu in sectorul privat	8.424,96	7.654,85	3.926,10

Figure 8 Share of final consumption for environmental services in final consumption of households

(%)

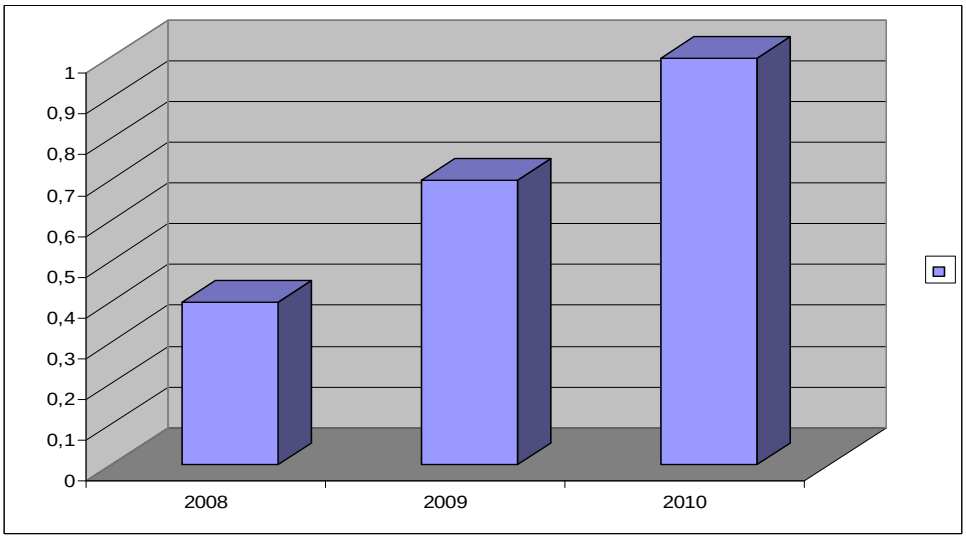
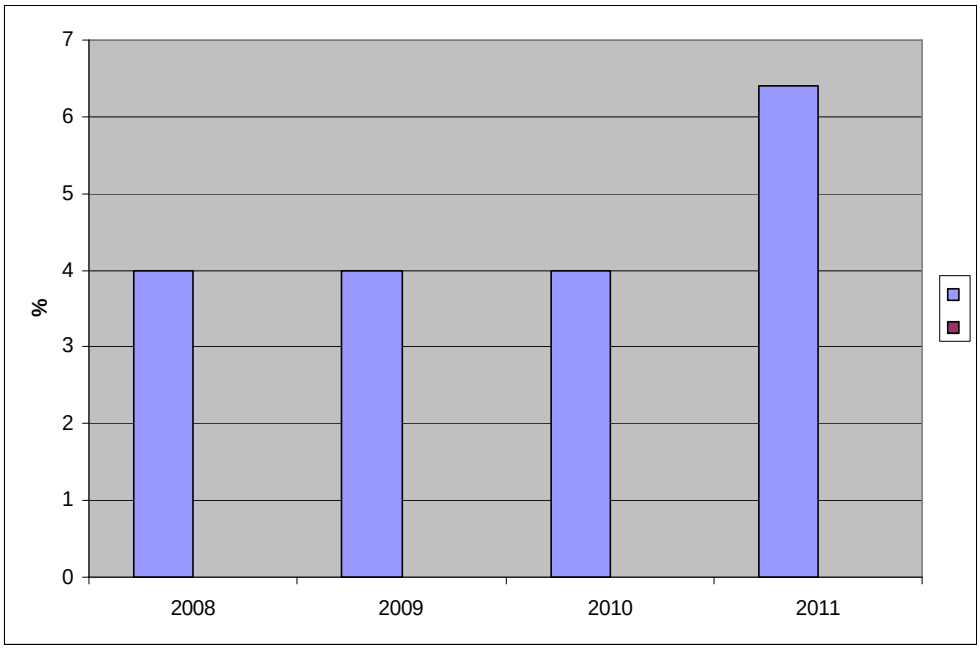


Figure 9 Share collective consumption for environmental services in all government collective consumption

(%)



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