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Environmental Protection Expenditure in European Union

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1. Introduction

Environmental protection expenditure should show the efforts being made to prevent, reduce and eliminate pollution resulting from the production or consumption of goods and services. The chapter presents the basic definitions and survey results of environmental protection expenditure in 25 European Union countries.

Environmental protection expenditure (EPE) is defined as the amount of money spent on all purposeful activities directly aimed at the prevention, reduction and elimination of pollution or nuisances resulting from the production processes (or consumption of goods and services). Data on environmental expenditure are collected from the European countries through the Joint OECD/Eurostat Questionnaire on Environmental Protection Expenditure and Revenues (EPER). The data covers five economic variables:

- investments for environmental protection:
 - pollution treatment investments,
 - pollution prevention investments,
- current expenditure for environmental protection,
- subsidies/transfers given for environmental protection activities.

The Questionnaire EPER contains also the data concerning household's expenditure for environmental protection.

The scope of Environmental Protection is defined according to the Classification of Environmental Protection Activities (CEPA, 2000), which distinguishes nine different environmental domains: protection of ambient air and climate, wastewater management, waste management, protection and remediation of soil, groundwater and surface water, noise and vibration abatement, protection of biodiversity and landscapes, protection against radiation, research and development and other environmental protection activities.

The purpose of the chapter is to provide the information, how vary the environmental protection expenditure in European Union over the years and what are the trends in specific domains of environmental protection. The comparison between the amount of costs in different countries of European Union is very interesting.

Environmental protection is an action or activity (which involves the use of equipment, labour, manufacturing techniques and practices, information networks or products) where the main purpose is to collect, treat, reduce, prevent, or eliminate pollutants and pollution or any other degradation of the environment resulting from the operating activity of the organization.

Environmental protection expenditure is the sum of capital and current expenditure for the undertaking of environmental protection activities.

Investment expenditure refers to financial or material costs, which aim at creating new permanent resources or improving (reconstruction, extension, restoration, adaptation or modernization) the existing objects of permanent property. It also means costs of so called first investment equipment. Presented division of investment costs is developed according to the rules of national accounting system, compliant with the "SNA 1993" recommendations. Investment expenditure can be divided into permanent resources and other costs.

Environmental protection current expenditure includes costs of activity operation and maintenance (technology, process, equipment). Current expenditure is to prevent, reduce, dispose or eliminate pollution and other environmental losses caused by current activities of the entity. They include internal costs (including costs of operation and maintenance of environmental protection installations as well as environmental charges), costs of services provided by external entities, charges for sewage treatment and waste collection; costs of control systems, monitoring, laboratory research, management.

Investment and current environmental expenditure have been divided, according to the property sectors, into:

public sector – government institutions (central public administration, regional and local governments as well as public organizations and institutions mainly classified in NACE, Rev. 1 as 75),

- business sector – commercial enterprises, financial and insurance institutions as well as non-commercial institutions (all activities except NACE 75),
- producers specialized in environmental protection (NACE 37 and 90) whose main activity is providing services for environment protection, mainly waste collection disposal and sewage treatment,
- household sector – there is no clear distribution into investment and current expenditure in this sector; the specificity of household activities combines all the types of expenditure together (SERIEE, 1994).

The latest part of this chapter concerns Polish surveys of environmental protection expenditure in households.

2. Total environmental protection expenditure in UE

Total environmental expenditure in 2007¹ costs European economy around 220 billion euro². The biggest share was contributed by specialized producers – 41,2% of the total environmental expenditure, industry – 31,0% and public sector – 27,8% (Fig. 1 and Table 1).

The basic indicators used to analyse the dynamics of environmental expenditure are:

- contribution to Gross Domestic Product (GDP),
- the investment expenditure per inhabitant.

Environmental expenditure in EU25 in 2007 accounted for 1,8% GDP and in 2002 for 1,7% GDP (except household expenditure) are presented in Fig. 2.

¹ The latest available data.

² Household's expenditure are excluded.

Specification	Time					
	2007	2006	2005	2004	2003	2002
European Union (27 countries)	224 235 ^{e)}	205 960 ^{e)}	192 387 ^{e)}	184 629 ^{e)}	179 409 ^{e)}	173 353 ^{e)}
European Union (25 countries)	219 953 ^{e)}	202 686 ^{e)}	190 332 ^{e)}	182 792 ^{e)}	178 206 ^{e)}	172 052 ^{e)}
European Union (15 countries)	205 186 ^{e)}	189 410 ^{e)}	179 624 ^{e)}	173 023 ^{e)}	169 671 ^{e)}	163 963 ^{e)}
Belgium	:	:	133	6 245	5 963	5 752
Bulgaria	630	546	327	345	297	247
Czech Republic	2 613	2 309	1 449	1 410	1 050	675
Denmark	4 280	3 852	3 860	3 733	3 563	3 652
Estonia	424	399	265	209	121	134
Ireland	:	:	:	:	:	:
Greece	:	:	:	:	12	15
Spain	21 410 ^{e)}	19 988	18 744	17 593	16 610	15 190
France	40 893	36 662	34 548	34 175	31 061	30 201
Italy	55 479	52 409	48 690	46 764	41 608	46 005
Cyprus	286 ^{e)}	173	128	166	124	37
Latvia	218	180	92	85	87	102
Lithuania	605	572	293	226	178	188
Luxembourg	279	294	280	262	242	239
Hungary	2 002	1 945	2 027	1 780	1 485	1 358
Malta	:	:	:	:	:	:
Netherlands	11 493 ^{e)}	7 067	11 493	:	8 620	1 919
Austria	9 463	9 880	8 485	8 266	8 379	7 895
Poland	7 056	6 117	5 186	4 748	4 414	4 558
Portugal	1 773 ^{e)}	1 862	1 429	1 519	1 392	1 387
Romania	3 652	2 728	1 728	1 492	905	1 054
Slovenia	785	687	657	614	673	557
Slovakia	777	894	611	532	403	479
Finland	2 076	1 834	1 642	1 693	1 601	1 629
Sweden	2 169	1 989	2 055	1 807	1 776	1 677
United Kingdom	18 551 ^{e)}	15 903	14 456	13 224	12 454	11 802

: not available

e) estimated

Table 1. Environmental protection expenditure in European Union, million euro (Eurostat Data Navigation Tree)

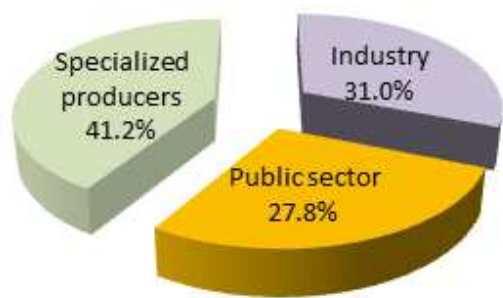


Fig. 1. The structure of environmental expenditure in 25 European Union countries in 2007 (Eurostat Data Navigation Tree)

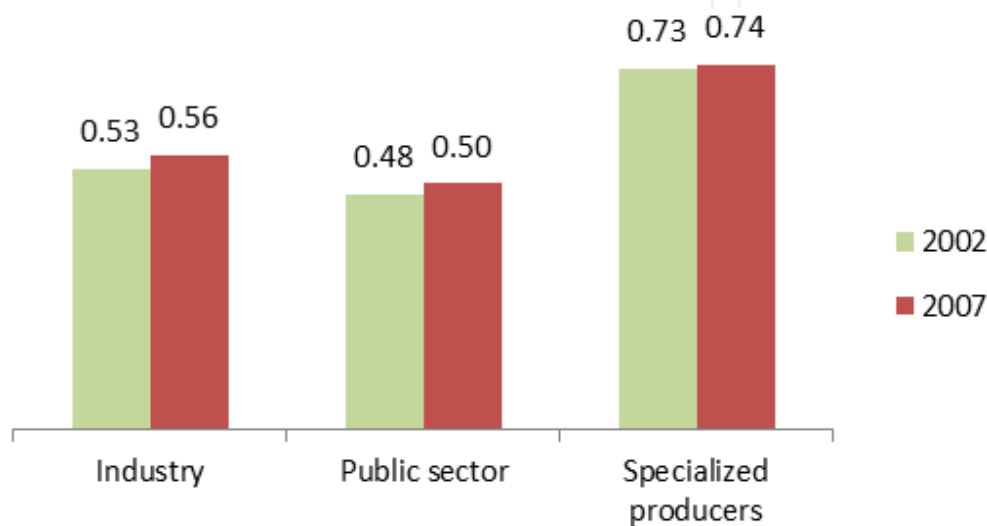


Fig. 2. Environmental protection expenditure in EU25 as % of GDP in 2002 and 2007 – by sectors (Eurostat Data Navigation Tree)

Comparing the share of environmental protection expenditures in GDP in particular countries, it could be noticed, that differences in environmental expenses are huge. Austria is one of the countries with the highest indicator in European Union (Fig. 3). Moreover, that expenditure per inhabitant in Austria is very high – in 2007 it was about 820 euro. In other EU countries this indicator came to 160 – 620 euro per inhabitant (Fig. 4).

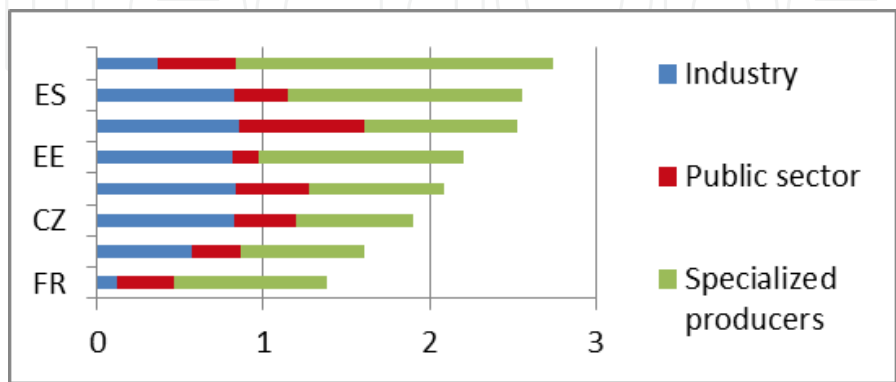


Fig. 3. Environmental protection expenditure in selected countries EU as % of GDP, data from the latest available survey (Eurostat Data Navigation Tree)

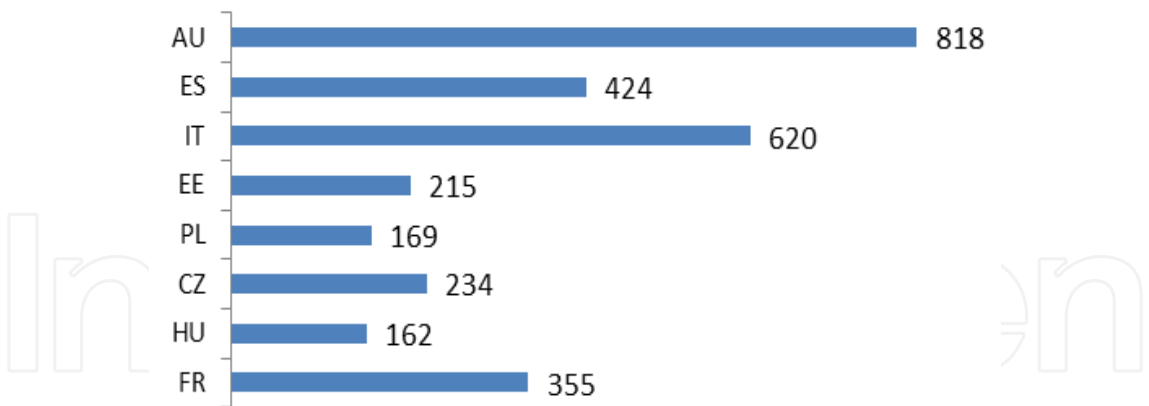


Fig. 4. Environmental protection expenditure in selected countries EU – euro per inhabitant, data from the latest available survey (Eurostat Data Navigation Tree)

Environmental expenditure, according to Classification of Environmental Protection Activities (CEPA), are divided into nine environmental domains:

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. Biodiversity and landscapes protection
7. Protection against radiation
8. Research and Development
9. Other environmental protection activities (mainly environmental administration and management, education, training and information, indivisible expenditure and other expenditure not classified elsewhere).

The business sector consists of:

1. agriculture, hunting, fishing, forestry,
2. industry sector:
 - mining and quarrying,
 - manufacturing,
 - electricity, gas and water supply sector,
3. other business.

However, the environmental protection expenditure occur mainly in the industry sector. During the period 2002-2007, the manufacturing sector in EU25, spent around 66% of total environmental protection expenditure, whilst electricity, gas and water supply sector and mining and quarrying sector 27% and 7% respectively. With reference to current expenditure this disproportion is bigger – 79%, 18% and 3% respectively (Georgescu, M.A. & Cabeca J. C., 2010).

In 2007, the leading environmental domain in industry in 25 EU countries was waste management (25,7%). The other important area of environmental expenditure was the wastewater management and protection of ambient air and climate, which accounted for 25,7% and 25,4% of total expenditure. The structure of expenditure by the environmental domains in industry in selected countries in 2007 is shown in Fig. 5.

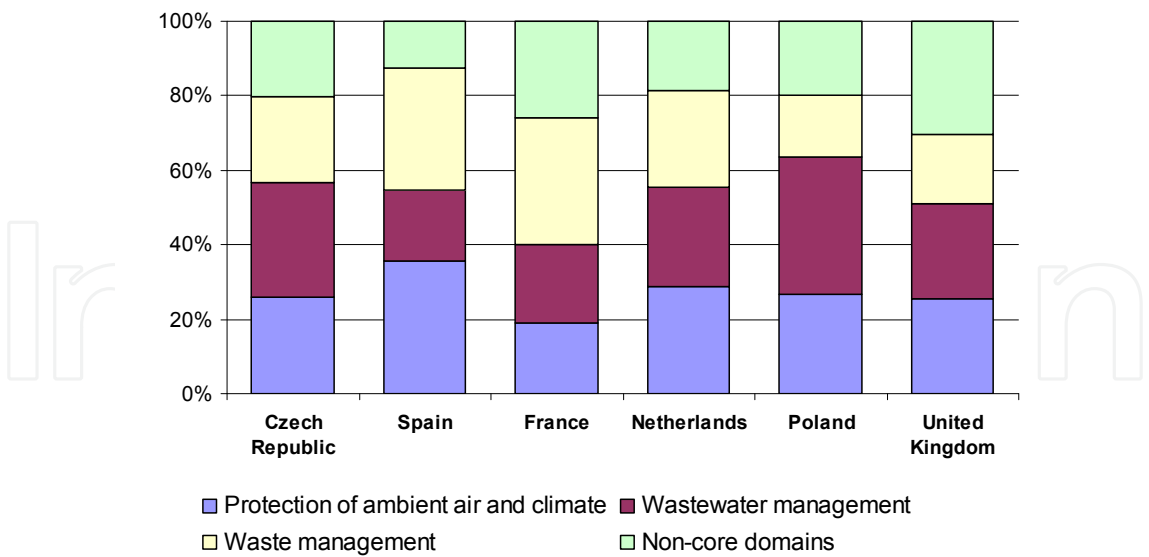


Fig. 5. Structure of environmental expenditure in industry of selected countries in 2007 (Eurostat Data Navigation Tree)

Current expenditure for environmental protection in 25 countries of European Union are higher than investments expenditure. In 2002-2007 current expenditure represented around 81% of total expenditure, whilst investment expenditure – 19% (Fig. 6).

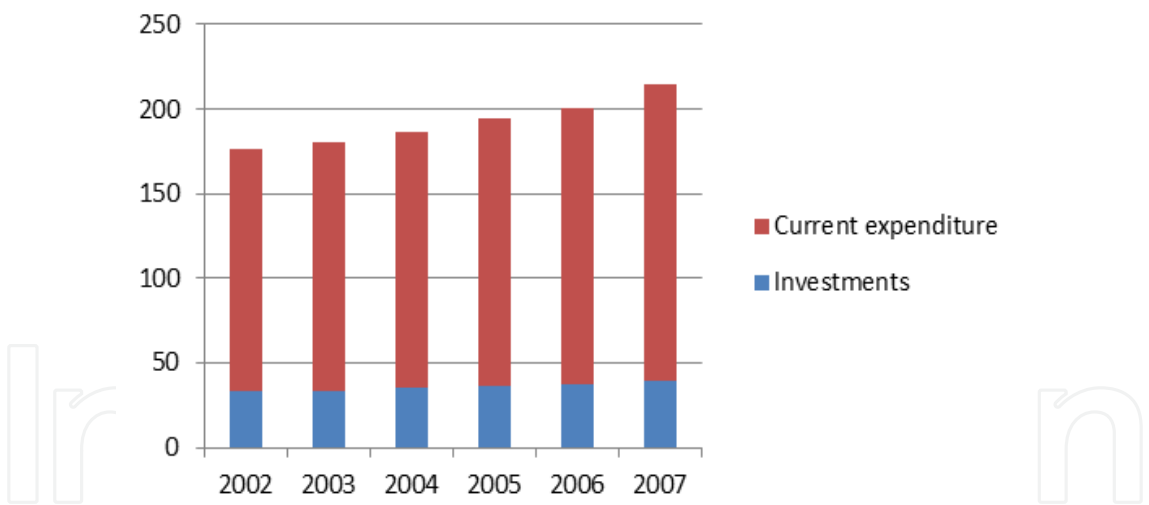


Fig. 6. Investment and current environmental protection expenditure in 25EU in 2002-2007, in million euro (Eurostat Data Navigation Tree)

2. Investment expenditure

Following the methodology applied in European Union (SERIEE, 1994), the investment expenditure includes end-of-pipe and integrated investments:

- the end-of-pipe investments (pollution treatment) – they do not affect in the production process itself (the production may be carried out without this kind of investment), but they reduce and dispose pollutants generated in the production process. The most

- investments in the public sector and in specialised producers – according to the methodology recommended by the Office of Statistics of the European Communities EUROSTAT – are entirely rated among end-of-pipe enterprises,
- integrated technology (pollution prevention) – they lead to reduction of generated pollution through the modification of technological processes which makes the production cleaner and more environmentally friendly. When a new production process is introduced, the environmental expenditure refer to the expenditure that outstrip the costs of cheaper and in working order, but less environmentally friendly equipment.

The share of integrated technology in industry in EU25 exceeded the level of 35% in 2001 and in the year 2006 it increased to 43,0% (Georgescu, M.A. & Cabeca J. C., 2010). In 2007 it was 39% (Fig. 7). Companies adjust to the requirements of environmental protection by changing a production technology and implementing the best available productive and environmental solutions. Further changes in the structure of investment expenditure can be expected due to the implementation of a directive concerning integrated prevention and reduction of pollution (a Directive 96/62/EEC on integrated prevention and reduction of pollution – IPPC). Enforcement of the Directive requires establishing standards of pollution emission based on a concept of the Best Available Technique – BAT, that guarantees application of low-waste technologies, economical raw materials and energy use as well as application of the latest scientific and technical achievements.

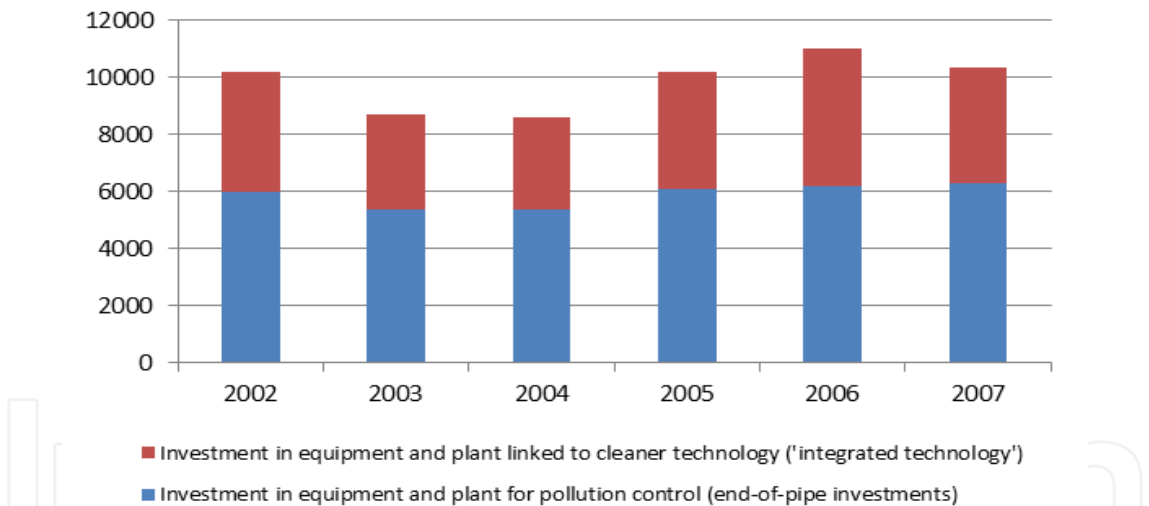


Fig. 7. Industry's environmental protection investments in EU25 in 2002-2007, million euro (Eurostat Data Navigation Tree)

In the industry sector, the environmental domain, which attracted most of capital expenditure for both pollution treatment and pollution prevention investments, was protection of ambient air and climate. The second domain was wastewater management. This tendency is noticed since 2002 (Fig. 8, Fig. 9).

The public sector and specialized producers sector were dominated by end-of-pipe investments, what resulted from the specificity of environmental protection activities. Major expenditure was allocated for building and modernization of wastewater plants, dumping sites and other waste disposal installations.

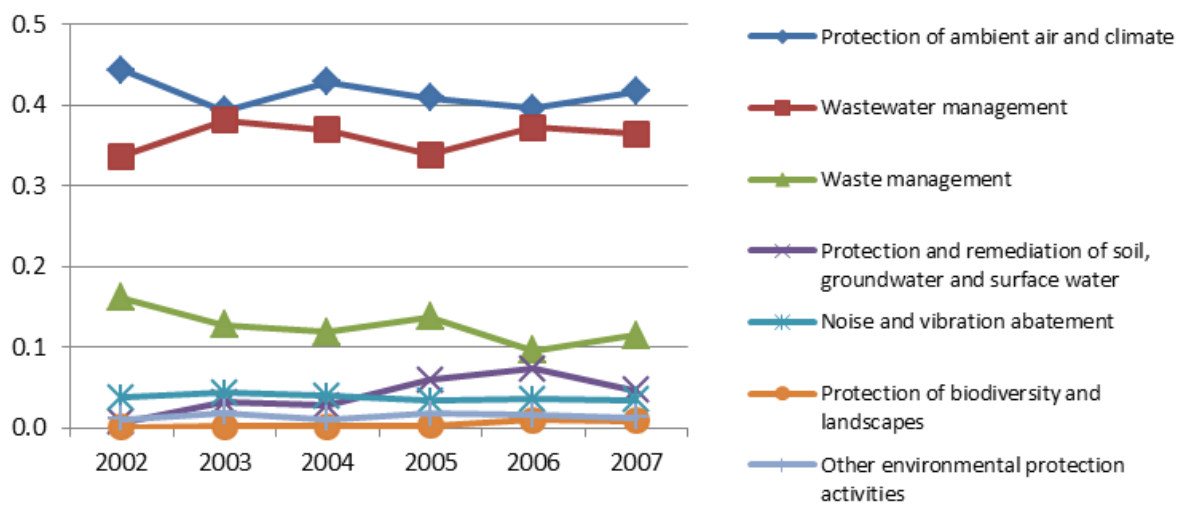


Fig. 8. The structure of industry’s pollution treatment investments in EU25 in 2002-2007 by the environmental domains (Eurostat Data Navigation Tree)

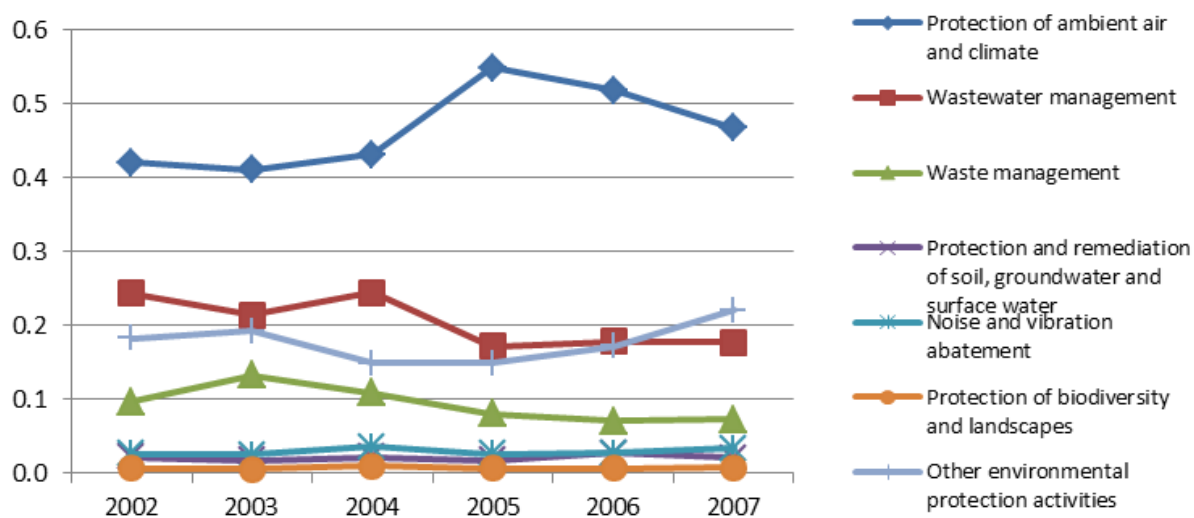


Fig. 9. The structure of industry’s integrated technology in EU25 in 2002-2007 by the environmental domains (Eurostat Data Navigation Tree)

3. Current environmental expenditure

Total current expenditure is the sum of internal current expenditure and fees/purchases.

Internal current expenditure includes the use of energy, material, maintenance and own personnel for measures made by the sector to protect the environment. A large part of internal expenditure is related to operating environmental protection equipment. There are also other internal expenditure such as general administration, education, information, environmental management and certification, research and development. Internal current expenditure includes purchases of connected and adapted non-capital goods³ such as extra cost for low sulphur fuels. These are sometimes not part of specific surveys but estimated based on existing information e.g. on number of units and unit costs.

Fees/Purchases includes all purchases of environmental protection services, both from public and private producers. These payments are clearly linked with an environmental protection activity done outside the enterprise and should exclude e.g. fines and penalties.

The payments include:

- Payments to specialised producers (enterprises) for waste and wastewater collection and treatment and payments to environmental consultants linked e.g. with environmental management and education.
- Payments to Public sector for waste and wastewater collection and treatment (whatever the name of the payments – fees, charges etc) as well as permits and surveillance fees.

Subsidies/Transfers (given or received) include all types of transfers financing Environmental Protection activities in other sectors, including transfers to or from other countries. These constitute expenditure for the paying sector (public sector), and revenue for the receiving sector (business sector and specialised producers sector). Payments of general environmental or green taxes (such as energy taxes) are excluded.

Sometimes Environmental Protection activities produce by-products that have an economic value. These could either be sold and generate revenues, or be used internally and lead to reductions in costs. Examples include energy generated or material recovered, as a result of waste treatment. There should always be a specific Environmental Protection activity (and expenditure) that these receipts stem from. Receipts from by-products is the sum of the sales value and the value of the cost-saving (if used internally) related to these by-products.

Public sector and specialised producers receive the payments for environmental protection services. This is entered as revenues in the respective sector (EPER).

The main environmental domain of current costs in industry sector during the period 2002-2007 was waste management (about 40%) and wastewater management (about 30%). Approximately, 10% concern other environmental protection activities, like general administration, education, information and environmental management – Fig 11.

³ Connected products are products which are used directly and solely for environmental protection (for example septic tanks, filters, waste bags).

Adapted products are products that are less polluting, at the time of their consumption and/or scrapping, than equivalent traditional products. In most cases, such products are more costly, and their production and consumption are usually encouraged by fiscal and other incentives. Products which are cleaner (and therefore more environmentally friendly) when used or disposed of. These products are sometimes also called (environmentally) cleaner products. Only the extra-cost is accounted for in the environmental protection expenditure (Glossary of Environment Statistics, 1997).

Connected products are products which are used directly and solely for environmental protection (for example septic tanks, filters, waste bags).

Current expenditure in public and specialized producers sectors was directed largely towards ensuring a good provision of wastewater treatment and waste management services (Georgescu, M.A. & Cabeca J. C., 2010).

Internal current expenditure						
Related to operating environmental protection equipment						
Protection of ambient air and climate	Wastewater management	Waste management	Protection and remediation of soil, groundwater and surface water	Noise and vibrations abatement	Biodiversity and landscape protection	Protection against radiation
Research and development						
General administration, education, information, environmental management and certification						
(+) plus (-) minus						
Fees/purchases						
(+) plus or (-) minus						
Subsidies/Transfers						
(-) minus						
Receipts from by-products						
= (equals)						
Current expenditure						

Fig. 10. Classification of current expenditure on the environment in industry sector

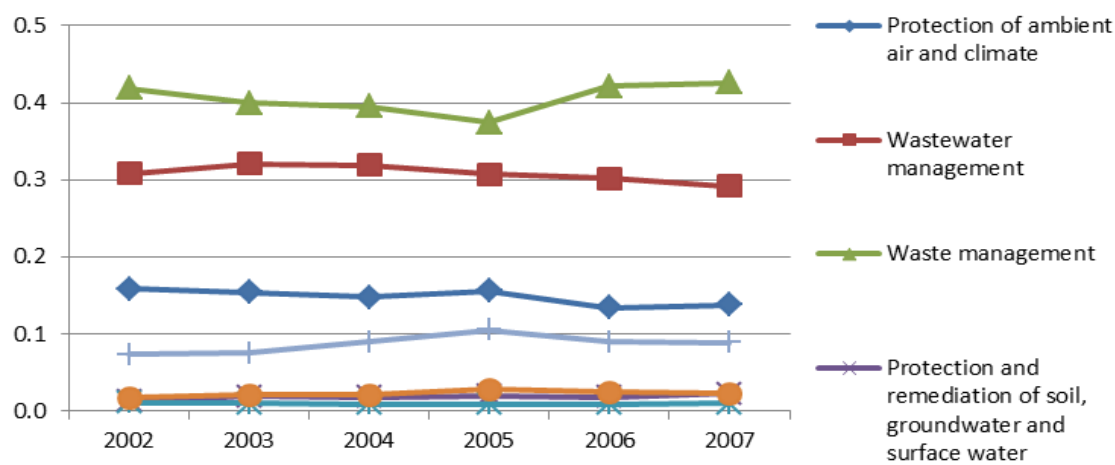


Fig. 11. The structure of industry’s current expenditure in EU25 in 2002-2007 by the environmental domains (Eurostat Data Navigation Tree)

4. Environmental expenditure in households

Environmental protection expenditure in households contains of 1) purchases of connected and adapted products and 2) payments and fees for environmental protection services – Fig. 12.

Expenditure (investment and current) - purchases					
Protection of ambient air and climate	Wastewater management	Waste management	Noise and vibrations abatement	Biodiversity and landscape protection	Other areas of environmental protection
(-) minus					
Subsidies					
+ (plus)					
Payments and fees					
collection and treatment of waste			collection and treatment of wastewater		
= (equals)					
Environmental protection expenditure					

Fig. 12. Classification of households expenditure on the environment

Based on Member Countries experience with the collection of data on private households there is no need to make a distinction between investments and current expenditure (EPER). Household purchases are viewed as current, in line with the national accounts. Examples are:

- protection of ambient air and climate:
 - heat consumption meters and thermo regulators;
 - modernization of central heating systems for the entire building and for a single apartment;
 - installation of equipment for the treatment of fuel gases;
 - purchase, operation and maintenance of air pollution control devices for motor vehicles e.g. extra costs for use of more environmentally friendly goods such as unleaded petrol, or service costs for proper adjustments of engines,
 - purchase and installation of energy-saving windows;
 - additional insulation for the building protecting against cold;

- wastewater management:
 - connection to the public sewer;
 - purchase of sewage treatment facilities such as septic tanks,
 - construction of individual wastewater treatment plants;
- waste management:
 - purchase of goods used in connection with waste management such as bins, bags, composts etc.;
- biodiversity and landscape protection:
 - tree and bush planting;
 - house facade repairs;
- noise and vibrations abatement:
 - purchase and installation of noise reducing windows;
 - fences and live fences, noise and vibrations reducing screens.

Household expenditure for environmental protection includes all payments and fees for services purchased from municipalities and specialised producers of environmental protection services. These include mainly:

- payments for the collection and treatment of waste,
- payments for the collection and treatment of wastewater.

Data of environmental protection expenditures in household is not available in Eurostat. Only a few EU countries conduct surveys in this sector (e.g. Austria, Hungary, Poland). In Poland, environmental protection expenditure in private households are examined from 1998. They are the biggest amount of environmental protection expenditures in Polish economy – during the period 1998-2009 it was approximately the same amount as the sum of expenditure in three sectors: public, business and specialized producers (Results of surveys of environmental protection expenditure conducting in 1998-2010. Ministry of the Environment in Poland).

The surveys are carried out on a representative sample of 1300 Polish households selected randomly by the Central Statistical Office for the purpose of examining Polish households budgets. The survey covered 6 groups selected in accordance with their social and economic status, namely:

- households of workers – 44,6% of the sample,
- households of farmers with additional source of income – 4,3%,
- households of farmers – 5,7%,
- households of self-employed people – 6,1%,
- households of the retired and pensioners – 35,2%;
- households supported from non-profit sources – 4,1%.

Environmental expenditure of households in 2009 amounted to 5,8 billion euro. The share of purchases, installations and constructions of appliances as well as connected goods accounted for 72,6%, while environmental services 27,4%.

Costs of purchase, installation and construction of environmental devices and products referred mainly to air protection (77,6%), especially purchase and installation of energy-saving windows, houses heat-insulation and heating installation modernization. The majority of expenditure concerning bio-diversity and landscape protection was allocated for renovations of building's elevations and with regard to protection against noise and vibrations – purchase and installation of soundproof windows (Fig. 13).

Among the costs of environmental services, the majority (68,3%) consisted of wastewater collection, treatment and discharge fees. The rest of 33,7% was constituted of waste collection charges.

It should be noted, however, that the rates of fees for the environmental services related to the environmental protection depended on the type of a building. For the purpose of the survey two main groups were defined: a multi-family apartment house (53% households in the sample) and a single-family house (43%). Moreover, in the case of 4% households the delivered information was the total cost of environmental protection products and services for their house (a single-family house), garage, summer house and bungalow. The average services fees for different types of buildings are presented in Fig. 14.

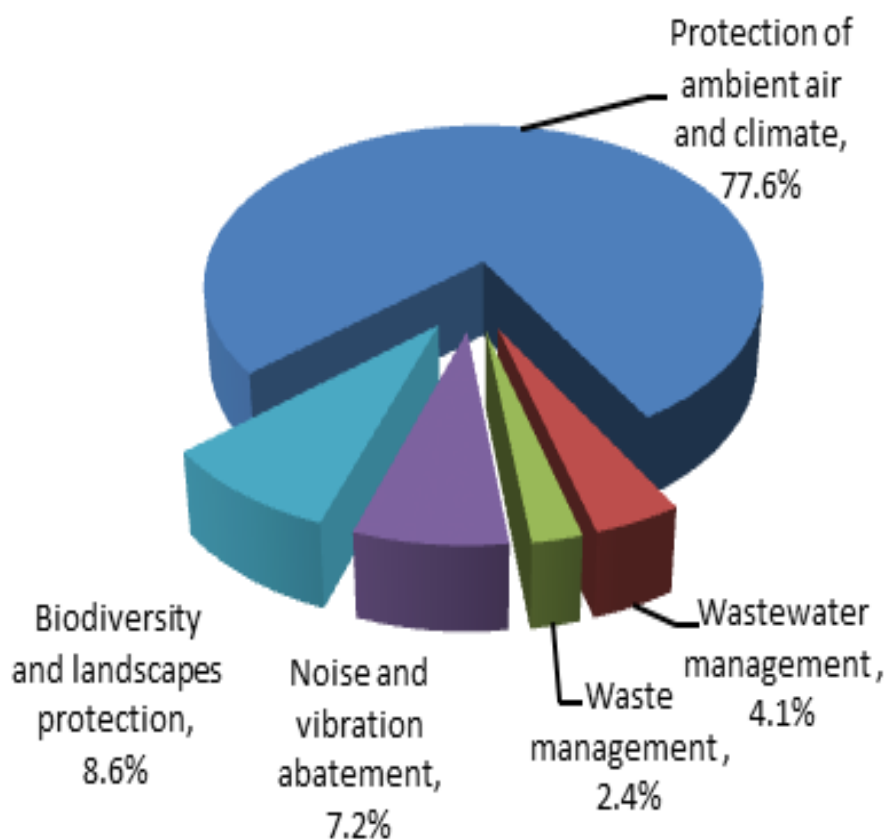


Fig. 13. The structure of expenditure for purchasing connected goods to households in 2009 in Poland (*Environment 2010. Statistical Information and Elaboration*, 2010).

Many owners of single-family houses, mainly in the country, most probably used to discharge their wastewater directly on the farmland and the most popular way of waste disposal was burning them or taking it to an unauthorized dumping ground to avoid the costs of utilization. The amount of charges for the environmental protection services was unrelated to the social and economic status of the members of the household. However, the highest expenditure on the purchase and installation of the equipment and products used directly for the purpose of environmental protection was recorded in households of self-employed people (excluding farmers) – 397 euro in 2009, whereas the lowest – 38 euro in households supported from nonprofit sources. The average expenditure on the environment (services payments excluded) by source of income is presented in Fig. 15.

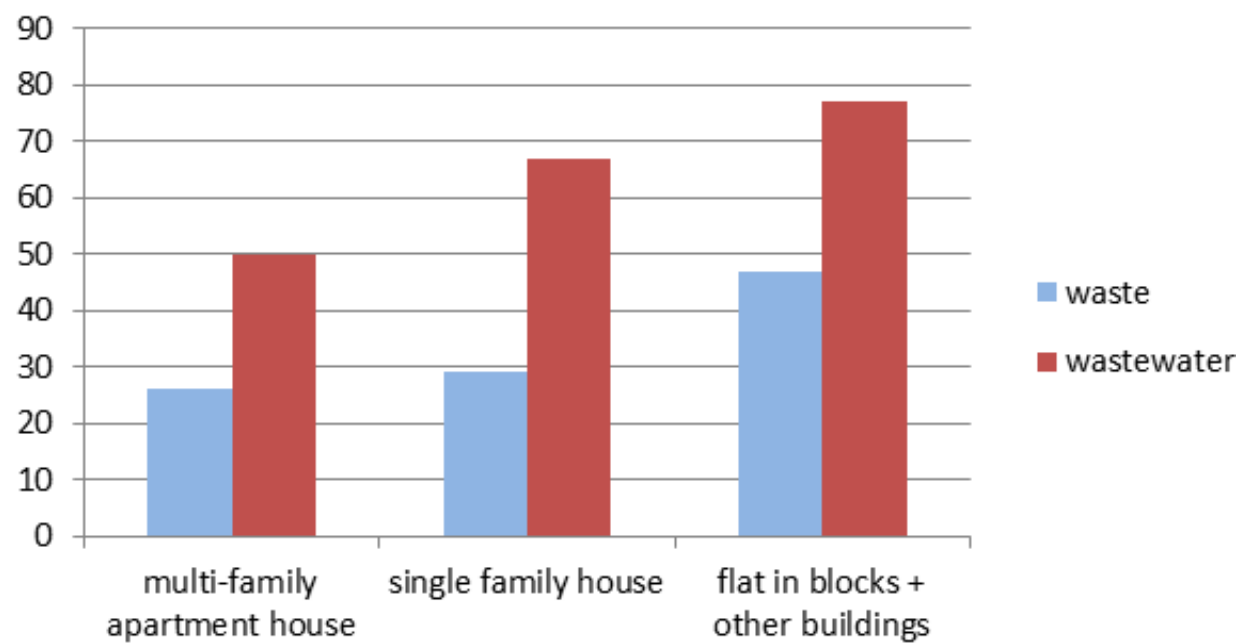


Fig. 14. Cost of environmental protection services for different types of building in Poland in 2009 (in euro).

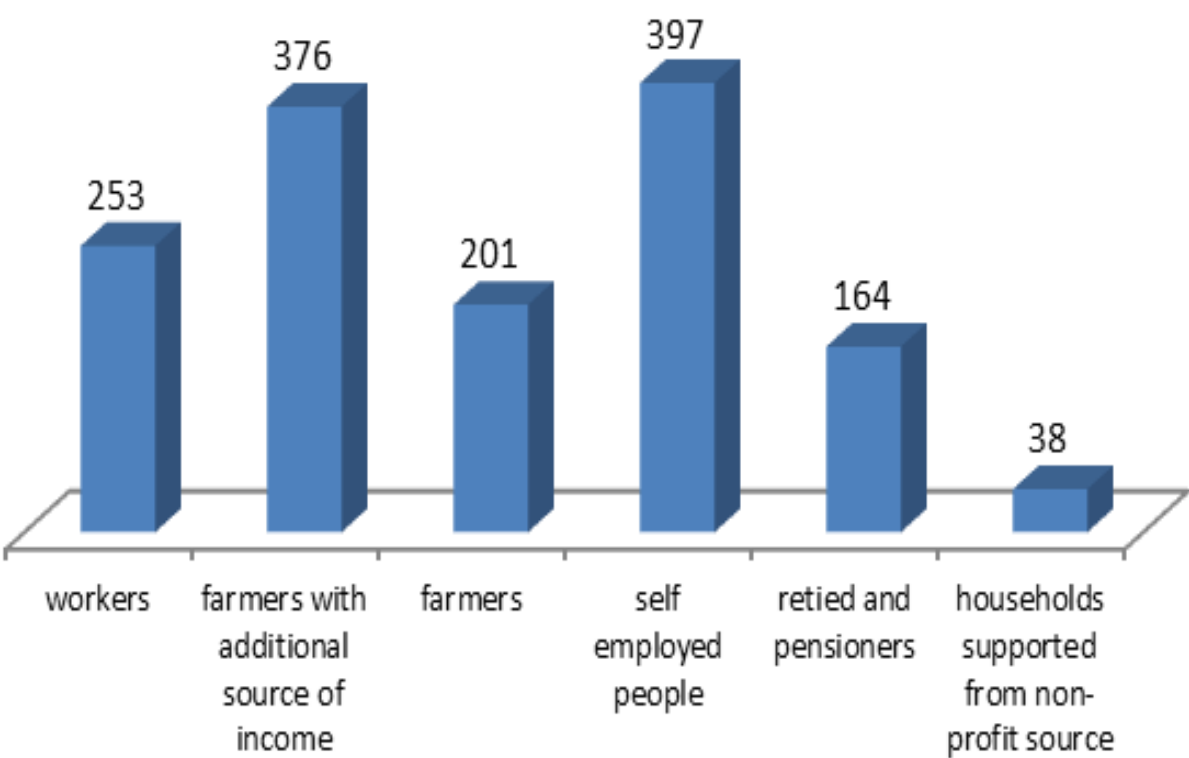


Fig. 15. The amount of expenditure on the purchase and installation of the equipment and products used directly for the purpose of environmental protection by source of income in all surveyed Polish households in 2009 (in euro).

5. Conclusion

Eurostat works towards systematically collecting environmental statistics for all economic sectors within the EU. These statistics are used to assess the effectiveness of new legislation and policies and to analyse the links between environmental pressures and the structure of the economy.

For many years, European statistical services have collected data on air pollution, energy, water consumption, wastewater, solid waste, and their management. The links between these data and environmental data of an economic nature, such as environmental expenditure enable policymakers to consider the environmental impacts of economic activities, for example on resource consumption, air or water pollution, and waste production, and to assess actions (such as investment and current expenditure) that may be carried out to limit the causes and risks of pollution.

The analysis of spending on environmental protection has a strategic interest and allows an evaluation of environmental policies already in place. A low level of expenditure does not necessarily mean that a country is not effectively protecting its environment. Indeed, information on expenditure tends to emphasise clean-up costs at the expense of cost reductions which may have resulted from lower emissions or more effective protection measures (Georgescu, M.A. & Cabeca J. C., 2010).

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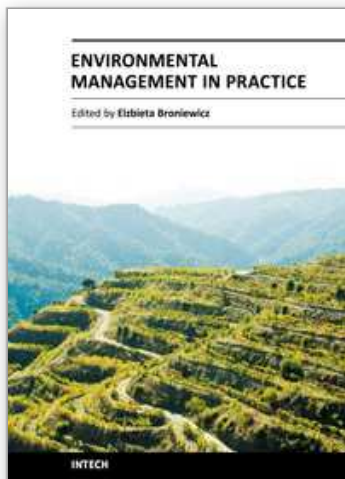
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In recent years the topic of environmental management has become very common. In sustainable development conditions, central and local governments much more often notice the need of acting in ways that diminish negative impact on environment. Environmental management may take place on many different levels - starting from global level, e.g. climate changes, through national and regional level (environmental policy) and ending on micro level. This publication shows many examples of environmental management. The diversity of presented aspects within environmental management and approaching the subject from the perspective of various countries contributes greatly to the development of environmental management field of research.

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