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Pollution Abatement and Control Expenditure in OECD Countries

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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Introduction

In 1989, the OECD Council meeting at Ministerial level called, inter alia, for a next generation work programme on environmental economics that would integrate environment and economic decision-making more systematically and effectively. This was reiterated during several G-7 Economic Summits, as well as by the meeting of the OECD Environment Committee at Ministerial level in 1991.

More specifically, a 1991 Recommendation of the OECD Council on Environmental Indicators and Information made explicit reference to work on pollution abatement and control (PAC) expenditure statistics to link environmental and economic information.

This mandate reinforced the work on pollution abatement and control expenditure that has been pursued in OECD for over ten years. The latest product of this work was a statistical compendium, which was published in 1990 (Environment Monographs No. 38, *Pollution Abatement and Control Expenditure in OECD Countries*). In 1991, the OECD Group on Economic and Environment Policy Integration approved a revised questionnaire for the 1992 OECD survey. The revised questionnaire reflected developments and comments from Member countries and assured consistency with related activities started by EUROSTAT and the UN-ECE. Data collection was carried out in collaboration with the OECD Group on the State of the Environment. OECD Member countries also suggested that the results of the 1992 survey should be accompanied by methodological explanations and by a discussion of the use and limits of PAC statistics for decision-makers. The OECD Group on Economic and Environment Policy Integration agreed to the derestriction of this document under the responsibility of the Secretary-General.

This document consists of three parts. Part 1 deals with concepts and methodological principles that apply to the compilation of PAC expenditure data. This conceptual framework is the basis for Part 2, which deals with the use and limits of PAC expenditure data for decision makers. Part 3 presents the results from the 1992 survey in two sections: first, as summary tables across countries and, second, in more detailed tables for individual countries. Each country table is accompanied by a note on the specific country methodology.

Part 1
Concept and Methodology

Definition of "Pollution Abatement and Control"

In this study, pollution abatement and control (PAC) activities are defined as purposeful activities aimed at the prevention, reduction, and elimination of pollution or nuisances that could have a harmful effect on the environment. This definition excludes natural resource management and activities such as the protection of endangered species (fauna and flora), the establishment of natural parks and green belts as well as activities to exploit natural resources (such as the supply of drinking water). Other exclusions are expenditure intended either for workplace protection or for the improvement of production processes for commercial or technical reasons, even though they may have environmental benefits. In total, PAC expenditure comprises the flow of investment and current expenditure that is directly aimed at pollution abatement and control, and which is incurred by the public sector, the business sector and private households.

Three conceptual issues are associated with the statistical treatment of PAC expenditure:

-- definition of a baseline for PAC expenditure;
-- treatment of integrated pollution control technologies;
-- avoiding double-counting.

Each of these issues is important for the correct compilation, use and interpretation of PAC expenditure data. The following sections will consider each of these items.

Defining the baseline

Often, investment or current expenditure have positive environmental effects without being directly motivated by concerns for the environment. One example is energy-saving investment carried out as a result of rising oil prices. Thus, business sector investment in environmentally friendly equipment may be part of normal, profit-maximising business behaviour. This type of expenditure can be distinguished from other expenditure that is directly incurred for PAC purposes (e.g., as a consequence of government environmental policies and regulations).

The question arises whether PAC expenditure should only include the expenditure that is directly incurred for PAC purposes or all expenditure with positive environmental effects. The answer depends on the use of PAC expenditure data:

-- If PAC expenditure data are to help identify the financial consequences of government environment policy, only expenditures incurred directly for PAC purposes should be included.
-- If the objective of collecting PAC expenditure data is to assess the overall links between capital formation and pollution burden or to identify the share of overall expenditure

which has positive effects for the environment, all expenditure with positive environmental effects should form part of the PAC data set.

Most OECD Member countries, in their statistical approaches, only include expenditure that is directly aimed at environmental protection. This approach was also adopted in the OECD questionnaire agreed upon by Member countries. In statistical practice, the identification of such expenditure remains difficult, particularly in the business sector, where firms may be unable to distinguish the different motives for investment expenditure. Because it is difficult to identify when the less wasteful use of raw materials is really for the purpose of pollution abatement, the measurement of air and water pollution abatement spending may depart from the baseline outlined above. For example, for solid waste, some countries employ simple, pragmatic solutions: the United States routinely attributes a fixed proportion (70 per cent) of expenditure for collection and disposal of municipal solid waste to pollution abatement and control (30 per cent are assumed to be normal rather than attributable to governmental environmental policies and regulations).

Integrated technologies

The abatement and control of residuals from production processes can take place either by end-of-pipe technology, which is attached to a given production process, or by changing the process itself. Investments in end-of-pipe technologies do not change the production process and the entire outlay is for pollution control. For integrated technologies, the problem arises how to identify the PAC part of total capital expenditure. In principle, those outlays over what would have been paid for a cheaper, viable, but less environmentally benign plant should be recorded as PAC expenditure. There is, however, no easy way to handle this problem in statistical practice. One possibility is to pose this question explicitly in business surveys. Experience from the United States, Germany or the Netherlands shows that respondents often face difficulties in delivering accurate replies.

It is likely that the problem of accounting for integrated technology is becoming increasingly important. Government environment policies and firm strategies have moved from curative to preventive approaches, thus increasing the relevance of integrated technologies as opposed to end-of-pipe solutions.

Avoiding double-counting

As economic agents interact, the same pollution control activity can be recorded with several agents, making double counting a possibility. One example is private sector PAC expenditure subsidized by the government. Unless a clear distinction is made between the execution and the financing of PAC activity, both the public sector and the firm will report expenditure for PAC purposes and double counting occurs. Thus, the distinction between the execution of an environmental service (*abater principle*) and the financing of the environmental service (*financing principle*) is important.

The OECD questionnaire follows a structure that links these two approaches. Figure 1 presents the basic case with financial flows only between the public and the private sector. Investment plus current expenditure minus receipts from by-products of PAC activity make up the expenditure according to the abater principle. Purely financial transfers in the form of subsidies, fees or charges account for the transition to the financing principle. In theory, this approach could cover the various

financial flows within the private sector (i.e. an input-output table for PAC market transactions) and within the public sector (flows of funds between different levels of government). At present, however, the availability of data limits the possibility of taking such a comprehensive approach.

Figure 1. **Abater and Financing Principles**

Public Sector	**Private Sector**
Investment expenditure	Investment expenditure
+ Current expenditure	+ Current expenditure
- Receipts from by-products of PAC activity	- Receipts from by-products of PAC activity
= PAC expenditure according to the *Abater Principle (Expenditure 1)*	= PAC expenditure according to the *Abater Principle (Expenditure 1)*
+ Subsidies to the private sector	- Subsidies from the public sector
- Fees/charges from the private sector	+ Fees/charges to the public sector
= PAC expenditure according to the *Financing Principle (Expenditure 2)*	= PAC expenditure according to the *Financing Principle (Expenditure 2)*

Currently, few OECD Member countries evaluate PAC expenditure according to both principles. One example for complete evaluation is the Netherlands. Their work shows that differences between the expenditure according to the abater and the financing principles can be significant: taking into account subsidies and fees for the Netherlands public sector changes expenditures by nearly 75 per cent and, as such, has a significant impact on the sectoral structure of PAC expenditure.

Part 2
PAC Expenditure Data: Interpretation, Use and Limits

PAC expenditure is the **first-order, out-of-pocket expenditure** of those economic entities that implement control measures and undertake compliance activities (EPA 1990). As such, PAC expenditure does not provide more or less information than other types of expenditure such as health or education expenditure.

Total PAC expenditure provides a general **indication of** a country's **financial efforts directed at PAC**. However, as absolute figures, their relevance for policy purposes is limited and PAC expenditure has to be related to other variables. A commonly used way of comparing PAC expenditure across countries is to relate them to GDP or total gross fixed capital formation (Summary Tables 1 and 2).

Dimensions of PAC expenditure

There are several dimensions of PAC expenditure, each with its particular interpretation:

First, total PAC expenditure can be disaggregated by different **environmental media** (Summary Table 3). This indicates whether pollution control efforts are directed towards the protection of air and water, the management of waste or the reduction of noise.

Second, the disaggregation of total PAC expenditure by **economic sectors** points out the sectors (public sector, business sector, households) that are responsible for this expenditure. In Summary Tables 1-3 expenditure is allocated to the various sectors according to which sector incurs current and investment expenditure for PAC purposes (abater principle). The individual sectors' expenditure does not reflect financial transfers (fees, subsidies) which may take place between the public and the private sector. Any conclusions about the sharing of the financial burden between sectors must therefore be drawn with great caution.

Several national PAC statistics account explicitly for these financial flows (see Country Tables in Part 3 of this report). Such an evaluation of expenditure according to the financing principle facilitates the analysis of the direct financial effects of PAC activity.

Third, the distinction between **investment and current expenditure** helps to identify the pattern of abatement and control efforts over time. Typically, when PAC measures are first implemented, investment expenditure accounts for a large share of total PAC expenditure. Over time, current expenditure becomes increasingly important.

Measuring economic effects

PAC expenditure data form the basis for the calculation of the **costs** of PAC incurred by economic agents. In this context, it is important to notice the difference between expenditure and cost: as the life of capital goods spreads over several years, the **cost** of using capital goods also spreads over the service life. Investment **expenditure**, on the other hand, appear only in the year in which PAC capital goods are purchased; this does not accurately reflect the economic effects over time. Appropriate assumptions about service lives, interest rates, and several other parameters are needed to estimate PAC costs (see, e.g., EPA, 1990). For current expenditure, the notions of cost and expenditure coincide. From the viewpoint of assessing the economic impact of environmental policies, it would thus be preferable to look at cost rather than expenditure.

A different use of PAC expenditure data is to calculate shares of PAC in total cost or in total turnover for particular industries. Cost shares are a useful indicator to assess the effects of environmental regulation on **industry competitiveness**. In industries where cost shares of PAC are small, the impact of environmental policies will be felt to a lesser degree than in industry branches where these cost shares are high. Germany's PAC expenditure statistics have recently been used to evaluate these cost shares. On average, cost shares are relatively low (less than 3 per cent for large branches of industry). This figure hides, however, significant variation across individual industries. In the leather industry, for example, PAC accounts for a cost share that is higher than 30 per cent. In general, PAC expenditure varies also considerably over time: expenditure tends to be high following the implementation of new environmental regulations and lower in subsequent years.

Next to these potentially negative effects on industry competitiveness, PAC expenditure data are an important piece of information to **identify the positive economic effects** of environmental policies. Measures to protect the environment create demand for abatement technologies, clean production technologies and environmental consulting services and spur environment-related R&D. National and international statistics on PAC expenditure provide the basic information to estimate the size and evolution of markets and potentials for the **environment industry**.

Caveats

The relation between **PAC expenditure and the state of the environment** can only be explored in the overall context of a country and with supplementary information. Out of context, high PAC expenditure can be associated both with low environmental quality (the situation makes expenditure necessary) and with high environmental quality (which has improved as a result of PAC expenditure).

PAC expenditure measures the economic efforts to **control pollution**; it does not measure **damage cost**. As such PAC data should not be generalised to wider cost/benefit analysis, which would decide whether abatement is justified. In deciding whether to undertake abatement, damage costs should be used. These are often very different from control costs.

The remainder of this report presents the main results from the 1992 survey of PAC expenditure in OECD Member countries. Since the last survey in 1988, country coverage and the **international comparability of data** have improved. In many instances however, definitions and methodologies remain diverse across Member countries. International comparisons should therefore be limited to orders of magnitude.

Part 3

Results of the 1992 OECD Survey

Part 3.1
Summary tables[a]

a) Caveat: *The following summary tables should be interpreted bearing in mind that data are not fully comparative across countries.*

Summary Table 1 **PAC Expenditure as a Percentage of GDP**

	1985	1987	1988	1989	1990
PUBLIC AND PRIVATE SECTORS[b]					
Canada[c]	..	..	..	1.1	..
United States	1.4	1.4	1.3	1.4	1.4
including private households	1.7	1.7	1.6	1.6	1.6
Japan[d]	..	1.1	1.1	1.1	1.1
Austria[e]	..	1.7	1.7	..	..
including private households	..	1.8	1.8	..	..
France[f]	0.8	1.0	1.0	1.0	1.0
including private households	1.0	1.2	1.2	1.1	1.1
w.Germany	1.5	1.6	1.6	1.6	1.6
Netherlands	1.5	1.5	..	1.5	..
including private households	1.5	1.6	..	1.6	..
Portugal[g]	..	..	..	0.6	
including private households	..	..	..	0.8	..
United Kingdom[h]	1.3	..	..	..	1.5
PUBLIC SECTOR					
Canada[c]	0.7	0.7	0.7	0.8	0.9
United States	0.6	0.6	0.5	0.6	0.6
Japan	0.9	1.0	1.0	1.0	1.0
Austria	1.0	1.0	1.0	..	..
Denmark	0.7	0.8	0.9	0.9	1.0
France[f]	0.6	0.7	0.7	0.7	0.5
w. Germany	0.7	0.8	0.8	0.8	0.8
Italy	..	..	0.2	0.2	..
Netherlands	1.0	0.9	..	0.9	..
Portugal	..	..	0.5	0.4	..
Spain	..	0.5	0.5	0.6	0.6
Sweden[i]	..	0.7	..	..	..
Switzerland	0.7	..	0.7	0.8	..
United Kingdom[h]	0.7	..	..	..	0.4

a) Based on the abater principle (Expenditure 1)
b) Based on public and business sectors, unless otherwise noted
c) Secretariat estimates based on selected national reports
d) Partial figure. Data for business sector current expenditure are not available
e) Although Secretariat estimates were made to remove double counting of wastewater fees, other cases of double counting may still remain
f) 1985 data do not include street cleaning
g) Data include Secretariat estimates of business sector current expenditure
h) 1985 and 1990 data are not comparable (see page 39)
i) 1987 data refer to 1986.

Source: OECD

Summary Table 2 **PAC Investment Expenditure as Percentage of Gross Fixed Capital Formation**

		1985	1987	1988	1989	1990
Canada	Business sector	..	..	..	0.8	..
USA	Public sector	1.1	1.4	1.2	1.3	1.4
	Business sector	2.0	1.9	1.9	1.9	2.0
	Business and public	3.1	3.3	3.1	3.2	3.4
Japan	Public sector	2.9	3.2	3.0	2.9	2.6
	Business sector	0.5	0.3	0.3	0.3	0.3
	Business and public	3.4	3.5	3.3	3.2	3.0
Austria[a]	Public sector	2.7	2.5	2.1	..	..
	Business sector	..	1.4	1.4	1.1	1.0
	Business and public	..	3.9	3.5	..	..
Denmark	Public sector	1.0	1.2	1.8	1.9	1.8
France	Public sector	0.8	0.8	0.9	0.8	0.7
	Business sector	0.4	0.4	0.4	0.4	0.4
	Business and public	1.2	1.3	1.3	1.2	1.1
w.Germany	Public sector	1.9	2.1	2.0	2.0	2.1
	Business sector	1.6	2.0	2.0	1.7	1.4
	Business and public	3.5	4.1	4.0	3.7	3.5
Italy	Public sector	..	..	1.0	0.9	..
Netherlands	Public sector	2.2	1.3	..	1.0	..
	Business sector	1.0	1.6	..	1.3	..
	Business and public	3.2	2.9	..	2.3	..
Portugal	Public sector	..	..	1.0	1.0	..
	Business sector	..	..	0.5	0.7	..
	Business and public	..	..	1.5	1.6	..
Spain	Public sector	..	0.6	0.6	0.8	0.8
Sweden	Business sector	0.8	..	1.2	..	..

a) 1989 and 1990 business sector data do not include expenditure by electric utilities.

Source: OECD

Summary Table 3 **Investment and Current Expenditure in PAC**

	Year	Public Sector			Business Sector			Private	
		Per	‰	‰	Per	‰ GDP	‰ GFCF	Per	‰ PFC
Canada[a]	1989	88.6	5.4	..	21.6	1.1	3.5	..	..
United States	1990	93.7	4.4	13.2	52.8	2.5	6.8	..	..
Japan[b]	1990	..	..	..	..	..	0.7	..	..
Austria[c]	1990	89.1	6.2	18.8	38.5	2.7	8.6	..	..
Denmark	1990	82.0	5.0	16.2	..	..	..	..	..
France	1990	53.4	3.1	5.1	21.0	1.2	1.6	10.4	1.0
w.Germany	1989	87.7	5.1	16.6	45.1	2.6	4.3	..	..
Italy	1989	31.9	2.1	8.7	..	..	..	..	..
Netherlands	1989	65.5	4.5	7.0	24.7	1.7	3.6	-	-
Portugal[d]	1989	20.1	2.6	7.0	7.1	0.4	1.5	-	-
Spain	1990	38.4	3.3	5.2	..	..	..	..	..
Sweden[e]	1986	43.0	3.1	6.7	..	..		..	..
Switzerland[f]	1989	92.9	4.7	..	..	..	..	..	..
United	1990	10.6	0.7	1.0	79.8	5.1	13.9	..	..
EXPENDITURE ON WASTE									
Canada[a]	1989	30.5	1.8	..	10.4	0.5	0.9	..	..
United States	1990	32.4	1.5	-	62.7	2.9	2.3	..	..
Japan[b]	1990	..	..	..	..	..	0.2	..	..
Austria[c]	1990	51.5	3.6	1.6	12.2	0.8	1.6	..	..
Denmark	1990	54.3	3.3	1.9	..	..	..	..	..
France	1990	54.9	3.1	1.1	19.0	1.1	0.6	3.5	0.4
w.Germany	1989	44.1	2.6	2.8	18.7	1.1	1.6	..	..
Italy	1989	2.4	0.2	0.8	..	..	..	..	..
Netherlands	1989	44.9	3.1	2.8	12.9	0.9	1.3	-	-
Portugal[d]	1989	6.1	0.8	1.5	6.3	0.2	0.6	-	-
Spain	1990	26.4	2.2	1.0	..	..	..	..	..
Sweden[e]	1986	35.7	2.6	4.1	..	..		..	..
Switzerland[f]	1989	58.9	3.0	..	..	..	..	..	..
United	1990	31.7	2.0	..	30.9	2.0	..	..	..
EXPENDITURE ON AIR									
Canada[a]	1989	..	..	..	22.8	1.2	3.8	..	..
United	1990	3.9	0.2	0.3	68.4	3.2	11.3	36.8	2.5
Japan[b]	1990	..	..	..	..	..	1.7	..	..
Austria[c]	1990	0.3	0.0	..	37.7	2.6	5.9	17.9	2.1
Denmark	1990	..	..	..	..	..	..	..	..
France	1990	..	..	..	17.6	1.0	1.6	1.6	0.2
w.Germany	1989	0.4	0.0	0.1	72.5	4.2	4.3	..	..
Italy	1989	-	-	..	..	..	..	..	..
Netherlands	1989	2.1	0.1	-	29.0	2.0	3.6	15.6	1.8
Portugal[d]	1989	0.3	0.0	0.0	0.8	0.1	1.5	0.1	-
Spain	1990	1.3	0.1	0.5	..	..	..	..	..
Sweden[e]	1986	4.4	0.3	0.7	..	..		..	..
Switzerland[f]	1989	..	..	..	..	..	..	..	..
United	1990	0.9	0.1	-	50.3	3.2	8.6	..	..

Per capita : investment and current expenditure in PAC, per head, expressed in US$ and at current purchasing power parities
‰ GDP : investment and current expenditure in PAC, per 1 000 units of Gross Domestic Product
‰ GFCF : investment expenditure in PAC, per 1 000 units of Gross Fixed Capital Formation
‰ PFC : investment and current expenditure in PAC, per 1 000 units of Private Final Consumption

a) Secretariat estimates based on selected national reports.
b) The disaggregation of all public sector expenditure by environmental media is not available. There are no data for business sector current expenditure
c) Public sector and private households data refer to 1988 and 1989 respectively. Business sector data refer to 1990 and they exclude expenditure by electric utilities Although Secretariat estimates were made to remove double counting of wastewater fees, other cases of double counting may still remain
d) Business sector data include Secretariat estimates of current expenditure
e) Data for the public and private sectors refer to 1986 and 1985 respectively. The disaggregation of private sector current expenditure by environmental media is not available
f) Data for air include some expenditure on noise.

Source: OECD.

Part 3.2

CANADA

Sources and definition

In 1989, figures on PAC expenditure were collected in a pilot survey by Statistics Canada (1992). Here, PAC is defined as activity that seeks to eliminate or to reduce pollutants and waste that are emitted by the operations of business and government. As such, the sample included both the public and business sectors. PAC expenditure data relate strictly to end-of-pipe installations; expenditure for integrated technology were explicitly excluded.

In addition, a limited time series of public sector data is available. This is based on a survey of general government expenditure, from which the component of environmental expenditure may be estimated. Statistics Canada (1991) classifies these expenditure in categories that correspond very closely to those used in the OECD questionnaire.

It is noted that Environment Canada (1992) published the results of its own pilot project -- a market survey of environmental expenditure. Although these figures do include a PAC component, the terms of reference for that survey are quite different from those of the OECD questionnaire. In order to avoid confusion, only the figures from Statistics Canada are used in this report.

Characteristic activities and environmental media

From the 1989 pilot survey, statistics are available for the principal environmental media: wastewater, solid waste, and air. For the public sector, the "other" category includes expenditure on air pollution control. Capital expenditure on non-residential construction, fees for selected professional services, and interest charges on loans used to finance construction and capital purchases, are all taken into account. These expenditure figures exclude land purchases, remediation activities, monitoring, integrated technologies, and research and development (R&D). In the time series of government expenditure, the following are also considered PAC activities: water purification, sewage collection, pollution control, and garbage and waste collection.

Economic sectors

In this monograph, data for public sector PAC are based on the time series of government expenditure, which includes all outlays by federal, provincial, and local governments. In preparing this report, the Secretariat applied a factor of 50 per cent to remove the water supply component from the expenditure on "water purification/supply".

Business sector figures are taken from the 1989 pilot survey. These figures include subsidies and grants; therefore, the abater principle applies. Some information is also available on recovery and savings from PAC activities. The figures shown in this report are based on the following sectors: mining, manufacturing, utilities, and services (including institutions). In the tables of expenditure by environmental media, the Statistics Canada (1992) report on the pilot survey does not include estimates for non-sampled and non-responding firms. However, Annex F of that report does provide estimated sample-to-population ratios for capital expenditure. The Secretariat applied these factors to the business sector capital and current expenditure in order to arrive at figures that are amenable to international comparison.

CANADA[a] *Millions of dollars at 1985 prices*

		Water	Waste	Air	Other	Total	Addendum: R&D[b]
PUBLIC							
1985	Investment expenditure	..	..	..	..	..	..
	+Current expenditure	..	..	..	..	..	..
	-Receipts from	..	..	..	..	..	..
	Expenditure 1	1 693	564	..	1 193	3 451	58
1987	Investment expenditure	..	..	..	..	..	..
	+Current expenditure	..	..	..	..	..	..
	-Receipts from	..	..	..	..	..	..
	Expenditure 1	1 935	667	..	829	3 431	48
1989	Investment expenditure	..	..	..	..	..	..
	+Current expenditure	..	..	..	..	..	..
	-Receipts from	..	..	..	..	..	..
	Expenditure 1	2 493	858	..	1 068	4 419	50
BUSINESS SECTOR: TOTAL EXPENDITURE							
1989	Investment expenditure	360	93	395	147	995	..
	+Current expenditure	260	202	260	81	804	..
	-Receipts from	..	..	..	..	88	..
	Expenditure 1	..	..	..	..	1 710	..
BUSINESS SECTOR: INDUSTRY BRANCHES (1989)							
Mining and quarrying							
	Investment expenditure	35	13	22	x	70	..
	+Current expenditure	42	10	23	x	75	..
	-Receipts from	x	x	x	x	x	..
	Expenditure 1	x	x	x	x	x	..
Electricity, gas, water							
	Investment expenditure	x	8	x	x	75	..
	+Current expenditure	x	x	x	x	x	..
	-Receipts from	x	x	x	x	x	..
	Expenditure 1	x	x	x	x	..	..
Trade, finance, commercial services							
	Investment expenditure	3	x	4	x	21	..
	+Current expenditure	0.2	0.2	-	x	1	..
	-Receipts from	-	-	-	-	-	..
	Expenditure 1	4	x	4	x	22	..
Total manufacturing							
	Investment expenditure	370	70	370	..	810	..
	+Current expenditure	188	175	158	..	521	..
	-Receipts from	..	..	..	..	65	..
	Expenditure 1	559	244	529	..	1 267	..
Investment and current expenditure: selected manufacturing industries[d]							
ISIC 34	Pulp and paper	258	57	80	..	394	..
ISIC 35	Chemical products	55	24	29	..	108	..
ISIC 37	Primary metal industries	130	105	283	..	517	..

a) Secretariat estimates. Definitions and methodological notes are on page 14. 'x' denotes data that must be suppressed, according to the confidentiality stipulations of the Statistics Act
b) Source: OECD Basic Science and Technology Statistics
c) Residual that cannot be allocated to specific media
d) Deflated with the GDP index.
Source: OECD

Price Index	Used to deflate	1985	1987	1989
Gross fixed capital formation	Business sector investment expenditure	100.0	105.3	113.3
GDP	Business sector current expenditure and Expenditure 1 for the public sector	100.0	107.2	117.6

UNITED STATES

Sources and definition

In the United States, PAC expenditure data have been collected since 1972. Statistics are developed by the Bureau of Economic Analysis and published regularly in the *"Survey of Current Business"* (Rutledge and Leonard, 1992). Data on PAC expenditure for individual manufacturing industries are published by the Bureau of the Census. About 60 per cent of the data come directly from a number of primary sources (such as the survey on Pollution Abatement Costs and Expenditure, which is carried out by the Bureau of the Census); some 40 per cent are estimates based on indirect methods.

PAC expenditure is defined as expenditure for goods and services that are used to produce cleaner air and water and to dispose of solid waste in the United States. These figures cover most, but not all, PAC activities, which are defined as those resulting from rules and regulations restricting the release of pollutants into common property media such as air and water.

Characteristic activities and environmental media

PAC data comprise of two basic types of activities: pollution abatement, and regulation and monitoring. National R&D expenditure figures are available. Business investment expenditure includes expenditure for end-of-pipe technologies, as well as the additional cost incurred for integrated, environmentally benign technology.

Characteristic activities are cross-classified by environmental media. The principal areas are air, water, and solid waste. The "solid waste" category includes the collection, and disposal of solid waste, as well as the alteration of productive processes to generate less solid waste. The "other and unallocated" category refers to expenditure for abatement and control of noise, radiation and pesticide pollution, along with business expenditure not assigned to media.

Economic sectors

Public sector expenditure includes expenditure at the federal, state, and local levels. It is noted that, for this paper, the current and investment expenditure of government enterprises were allocated to the public sector.

The business sector comprises manufacturing and non-manufacturing establishments, including agricultural feedlot operators. Business sector PAC expenditure statistics show costs recovered from the sale of by-products of pollution control. Business is the only sector that recovers materials (e.g. metal filings) and energy (e.g. heat) during PAC activity. As such, it has by-product revenues from PAC activity.

PAC statistics classify expenditure according to the sector performing the PAC and thus, adhere to the abater principle. This implies that expenditure, e.g. for the removal of solid waste by municipalities, is classified according to the abater incurring them (i.e. the municipality), although revenues from payments by consumers may cover most of the operating expenses.

Private household expenditure relates exclusively to the purchase and operation of motor vehicle emission abatement devices.

UNITED STATES[a] *Millions of dollars at 1985 prices*

		Water	Waste	Air	Other	Total	Addendum: R&D[b]
PUBLIC SECTOR							
1981	Investment	6 958	..	551	..	7 509	..
	+Current expenditure	6 635	3 590	658	563	11 447	..
	-Receipts from	..	..	..	..	..	..
	Expenditure 1	13 594	3 590	1 209	563	18 956	..
1985	Investment	8 132	..	399	..	8 531	..
	+Current expenditure	7 904	4 338	680	379	13 301	..
	-Receipts from	..	..	..	..	..	..
	Expenditure 1	16 036	4 338	1 079	379	21 832	258
1990	Investment	10 869	..	254	..	11 123	..
	Current expenditure	10 202	6 878	603	508	18 190	..
	Receipts from	..	..	..	..	..	..
	Expenditure 1	21 071	6 878	857	508	29 313	332
BUSINESS SECTOR: TOTAL EXPENDITURE							
1981	Investment	4 658	998	8 338	..	13 994	..
	+Current expenditure	4 535	7 263	9 434	..	21 233	..
	-Receipts from	..	..	..	1 522	1 522	..
	Expenditure 1	9 193	8 261	17 773	(1 522)	33 705	..
1985	Investment	5 131	1 166	8 540	..	14 837	..
	+Current expenditure	5 122	7 117	8 954	..	21 193	..
	-Receipts from	..	..	..	1 049	1 049	..
	Expenditure 1	10 253	8 283	17 494	(1 049)	34 981	..
1990	Investment	5 560	1 854	9 321	..	16 735	..
	+Current expenditure	6 303	11 753	6 266	..	24 323	..
	-Receipts from	..	..	..	1 652	1 652	..
	Expenditure 1	11 863	13 607	15 587	(1 652)	39 406	..
BUSINESS SECTOR: TOTAL MANUFACTURING EXPENDITURE							
1989	Investment	1 794	642	1 781	..	4 218	..
	+Current expenditure	3 591	3 600	3 589	..	10 780	..
	-Receipts from	326	312	910	..	1 548	..
	Expenditure 1	5 060	3 930	4 460	..	13 450	..
PRIVATE HOUSEHOLDS							
1981	Expenditure 1	..	..	9 565	..	9 565	..
1985	Expenditure 1	..	..	11 839	..	11 839	..
1990	Expenditure 1	..	..	7 598	..	7 598	..

a) Definitions and methodological notes are on page 16
b) Source: OECD Basic Science and Technology Statistics.
Source: OECD

Price Index	Used to deflate	1981	1985	1990
Gross fixed capital formation	Investment expenditure of the public and business	95.8	100.0	105.7
Government final consumption	Public sector current expenditure and R&D	84.2	100.0	118.4
GDP	Business sector current expenditure	85.4	100.0	117.5
Private final consumption	Household expenditure	85.1	100.0	121.7

JAPAN

Sources and definition

In Japan, there are several continuing surveys on PAC expenditure. In these surveys, PAC is defined as those activities which directly contribute to pollution control.

Public sector surveys are conducted annually. Investment and current expenditure by the central government have been collected since 1967; data for local governments have been available since 1971.

For the business sector, figures on PAC investment expenditure by large companies (i.e., enterprises with assets of 100 million ¥ or more) have been collected since 1965. These surveys cover most manufacturing industries, along with the energy and mining sectors. Since 1977, statistics on small and medium-sized manufacturing firms have also been compiled. So far, there are no surveys of business sector current expenditure.

Characteristic activities and environmental media

PAC expenditure covers the following environmental media: air, water, soil, solid waste, noise and vibration, and odours.

Economic sectors

Public sector figures include investment and current expenditure (Expenditure 1) by both the central and local governments. These have been adjusted to avoid double counting, particularly with respect to the flow of subsidies from the central government to the local governments.

PAC statistics for the business sector include outlays by large companies in energy, mining and most manufacturing industries; no figures are available for large manufacturers of food and tobacco, wood and wood products. Expenditure by small and medium-sized firms represents the whole manufacturing sector. In all cases, data are only available for investment expenditure. Therefore, the tables represent only a partial total for business sector PAC expenditure.

At present, there are no surveys on household expenditure.

JAPAN[a] *Hundred million yen at 1985 prices*

		Water	Waste	Air	Other	Total	Addendum: R&D[b]
PUBLIC SECTOR							
1980	Investment expenditure	..	..	..	..	26 828	..
	+Current expenditure	..	..	..	..	4 002	..
	-Receipts from by-products	..	..	..	..	..	..
	Expenditure 1	..	..	..	..	30 831	..
1985	Investment expenditure	..	..	..	..	25 374	..
	+Current expenditure	..	..	..	..	3 717	..
	-Receipts from by-products	..	..	..	..	..	..
	Expenditure 1	..	..	..	..	29 091	85
1990	Investment expenditure	..	..	..	..	35 703	..
	+Current expenditure	..	..	..	..	3 883	..
	-Receipts from by-products	..	..	..	..	..	..
	Expenditure 1	..	..	..	..	39 586	86
BUSINESS SECTOR: TOTAL EXPENDITURE							
1980	Investment expenditure	695	230	2 232	675	3 832	..
	+Current expenditure	..	..	..	..	..	..
	-Receipts from	..	..	..	..	..	..
	Expenditure 1	..	..	..	..	..	..
1985	Investment expenditure	828	126	2 565	652	4 171	..
	+Current expenditure	..	..	..	..	..	..
	-Receipts from	..	..	..	..	..	..
	Expenditure 1	..	..	..	..		..
1990	Investment expenditure	978	295	2 284	1 048	4 606	..
	+Current expenditure	..	..	..	..	..	..
	-Receipts from	..	..	..	..	..	..
	Expenditure 1	..	..	..	..	..	..
BUSINESS SECTOR: INDUSTRY BRANCHES (1990)							
Mining and quarrying							
	Investment expenditure	7	3	1	-	11	..
Electricity, gas, water							
	Investment expenditure	154	22	1 476	358	2 010	..
Total manufacturing							
	Investment expenditure	818	271	807	690	2 856	..
Investment Expenditure: selected manufacturing industries							
ISIC 32	Textiles and leather	46	3	14	15	78	..
ISIC 34	Pulp and paper	108	38	168	60	375	..
ISIC 35	Chemicals	89	6	46	43	184	..
ISIC 36	Non-metallic mineral	21	4	26	8	58	..
ISIC 37	Iron and steel	73	61	188	102	424	..
ISIC 38	Machinery	246	66	1158	290	718	..

a) Definitions and methodological notes are on page 18

b) Source: OECD Basic Science and Technology Statistics.

Source: OECD

Price Index	Used to deflate	1980	1985	1990
Gross fixed capital formation	Investment expenditure by the public and	96.1	100.0	101.6
Government final consumption	Public sector current expenditure	88.3	100.0	112.4

AUSTRIA

Sources and definition

In Austria, data on environmental expenditure has been collected by the Central Statistical Office since the early 1980s. Industrial expenditure is based on several surveys conducted by the Austrian Chamber of Commerce (Bundeskammer, 1990). PAC expenditure is defined as expenditure that is directed towards avoiding, abating or controlling emissions and waste disposal into the environment.

Characteristic activities and environmental media

PAC activities include direct pollution abatement and control, planning, monitoring and regulatory activity. Data on expenditure for re-cultivation, R&D, and recycling are available in the Austrian statistics but these were excluded from the country table to provide a closer matching with OECD definitions. According to the Central Statistical Office, PAC expenditure statistics reflect end-of-pipe measures rather than integrated technologies.

Environmental media include air, wastewater collection and treatment, waste disposal and noise. For electric utilities, PAC expenditure cannot be allocated to different environmental media; therefore, only total expenditure figures are available. For purposes of international comparisons, only expenditure incurred by combustion-based electric utilities was included.

Economic sectors

Public sector expenditure covers all levels of government, i.e, the federal level, the state level, municipalities, and special institutions such as the "ecofund". No information is available on expenditure by agriculture and forestry, constructions and the service industries. Data on manufacturing industries only include firms with minimum size. Double counting occurs due to the addition of wastewater fees and waste fees in both the business sector and the public sector expenditure. According to the Central Statistical Office, industry wastewater fees amounted to some 0.8 billion shillings in 1987. Private household expenditure relates exclusively to air emission abatement expenditure for motor vehicles (price difference for cars equipped with catalytic converters).

AUSTRIA[a] *Millions of schillings at 1985 prices*

	Water	Waste	Air	Other[d]	Total	Addendum: R&D[b]
PUBLIC SECTOR						
1979 Investment	6 170	661	..	32	6 863	..
+Current expenditure	863	2 371	..	..	3 234	..
-Receipts from	..	..	..	..	..	..
Expenditure 1	7 033	3 032	..	32	10 097	33
1985 Investment	9 556	497	..	164	8 186	..
+Current expenditure	2 031	3 606	..	..	5 637	..
-Receipts from	..	..	..	..	..	..
Expenditure 1	11 587	4 103	..	164	13 823	64
1988 Investment	6 506	554	..	118	7 179	..
+Current expenditure	2 429	4 528	..	..	6 957	..
-Receipts from	..	..	..	..	..	..
Expenditure 1	8 935	5 082	..	118	14 136	87
BUSINESS SECTOR: TOTAL EXPENDITURE[c]						
1988 Investment	1 864	284	3 501	904	6 554	..
+Current expenditure	1 761	585	1 586	327	4 259	..
-Receipts from	..	..	..	..	..	..
Expenditure 1	3 625	869	5 087	1 232	10 813	..
1989 Investment	2 307	614	2 577	233	5 731	..
+Current expenditure	1 835	626	1 677	33	4 171	..
-Receipts from	..	..	..	..	..	..
Expenditure 1	4 142	1 240	4 254	266	9 902	..
1990 Investment	2 804	513	1 923	169	5 409	..
+Current expenditure	1 713	646	1 669	26	4 054	..
-Receipts from	..	..	..	..	..	..
Expenditure 1	4 517	1 159	3 592	196	9 463	..
PRIVATE HOUSEHOLDS						
1985 Expenditure 1	..	..	9	..	9	..
1988 Expenditure 1	..	..	1 550	..	1 550	..
1989 Expenditure 1	..	..	1 807	..	1 807	..

a) Includes Secretariat estimates. Definitions and methodological notes are on page 20
b) Source: OECD Basic Science and Technology Statistics
c) 1989 and 1990 data do not include expenditure by electric utilities
d) "Other" expenditure include outlays by electric utilities that cannot be allocated to specific media.

Source: OECD

Price Index	Used to deflate	1979	1985	1988	1989	1990
Gross fixed capital formation	Investment expenditure by the public and	75.8	100.0	107.5	110.6	114.2
Government final consumption	Public sector current expenditure	73.0	100.0	110.4	115.1	120.3
GDP	Business sector current expenditure	74.8	100.0	108.3	111.2	114.0
Private final consumption	Household expenditure	73.0	100.0	104.6	107.3	110.7

AUSTRIA *Millions of schillings at 1985 prices*

	Water	Waste	Air	Other	Total
BUSINESS SECTOR: INDUSTRY BRANCHES					
Mining and quarrying (1990)					
Investment	22	17	24	3	65
+Current	77	45	77	3	202
-Receipts from	..	..	..	..	..
Expenditure 1	99	62	10	6	268
Electricity (1988)					
Investment	..	..	..	..	723
+Current	..	..	..	..	305
-Receipts from	..	..	..	..	..
Expenditure 1	..	..	..	..	1 027
Total manufacturing (1990)					
Investment	2 782	496	1 899	166	5 343
+Current	1 636	601	1 592	24	3 852
-Receipts from	..	..	..	..	..
Expenditure 1	4 418	1 097	3 491	190	9 195
Investment and current expenditure: selected manufacturing industries (1988)					
ISIC 31 Food and	334	56	89	17	495
ISIC 32 Textiles and	106	42	76	10	234
ISIC 33 Wood and wood	12	19	100	14	145
ISIC 34 Pulp and paper	1 143	104	238	33	1 519
ISIC 35 Chemicals	1 096	257	2 263	41	3 657
ISIC 36 Non-metallic	142	77	352	24	595
ISIC 37 Iron and steel	345	65	1 434	11	1 855
ISIC 38 Machinery	340	165	416	42	964
ISIC 39 Other	9	9	21	1	40

DENMARK

Sources and definition

PAC expenditure statistics are collected by the National Agency of Environmental Protection. Their expenditure figures pertain to activities that are directed at the prevention, reduction, and elimination of pollution or other environmental nuisances. Data are available for the public sector and utilities.

Environmental media

Most of the public sector expenditure covers the areas of wastewater, waste collection and treatment. The "other" category of expenditure is also reported. This includes outlays related to noise, as well as expenditure that cannot be allocated to specific environmental media, such as general administrative expenditure.

PAC expenditure by utilities is directed exclusively towards the mitigation and prevention of air pollution.

Economic sectors

The data for the public sector include capital and current expenditure, subsidies, and fees; thus, PAC expenditure for this sector may be presented according to both the abater (Expenditure 1) and the financing (Expenditure 2) principles. For utilities, only the expenditure for investment and current expenditure (Expenditure 1) is available.

DENMARK[a] *Millions of kroner at 1985 prices*

		Water	Waste	Air	Other	Total	Addendum: R&D[b]
PUBLIC SECTOR							
1980	Investment	1 568	151	..	123	1 842	..
	+Current expenditure	1 434	1 091	..	569	3 094	..
	-Receipts from	..	..	..	..	..	..
	Expenditure 1	3 002	1 242	..	692	4 936	..
	+Subsidies	-	-	..	-	-	..
	-Fees	2 294	999	..	172	3 465	..
	Expenditure 2	708	243	..	520	1 471	..
1985	Investment	1 083	68	..	24	1 175	..
	+Current expenditure	1 481	1 215	..	642	3 338	..
	-Receipts from	..	..	..	..	..	..
	Expenditure 1	2 564	1 283	..	666	4 513	51
	+Subsidies	-	46	..	51	97	..
	-Fees	2 316	1 226	..	152	3 694	..
	Expenditure 2	248	103	..	565	916	..
1990	Investment	1 929	225	..	46	2 200	..
	+Current expenditure	1 290	1 852	..	788	3 930	..
	-Receipts from	..	..	..	..	..	..
	Expenditure 1	3 219	2 077	..	834	6 130	140
	+Subsidies	-	66	..	111	177	..
	-Fees	3 399	2 002	..	207	5 608	..
	Expenditure 2	(180)	141	..	738	699	..

a) Definitions and methodological notes are on page 24
b) OECD Basic Science and Technology Statistics.

Source: OECD

Price Index	Used to deflate	1980	1985	1990
Gross fixed capital formation	Public sector investment expenditure	68.3	100.0	120.5
Government final consumption	Public sector current expenditure and	69.3	100.0	127.3

FRANCE

Sources and definition

In France, data on PAC expenditure form an integral part of a regular analysis of the economic aspects of the environment (Ministère de l'Environnement, 1991). Data for industrial PAC expenditure are only partially derived from a direct, regular survey of establishments. Estimation methods are used to evaluate expenditure. Current expenditure of the public sector is estimated using the figures of a baseline study. Updated figures are produced through a set of observable variables such as the wage index for public servants, or information about the state of the equipment used for pollution control. Although certain definitions have changed over the years, consistent data on main expenditure categories have been available since 1979.

Characteristic activities and environmental media

PAC data cover the areas of pollution abatement, regulation and monitoring, and R&D. Business investment expenditure does not include expenditure for integrated technology.

Characteristic activities include:

-- wastewater collection and treatment;
-- abatement of polluting accidents such as oil spills;
-- collection and treatment of waste;
-- reduction of noise;
-- abatement of air pollution; available for private sector only. Public expenditure on air pollution control forms part of a different expenditure category, "general improvement and protection of the natural environment and the national heritage", which was excluded from the OECD survey. According to the Ministry for the Environment, the share of air pollution in public expenditure is comparatively small.

Economic sectors

Public sector expenditure includes all levels of government. In general, the abater principle is followed. In some years, for example 1988, evaluations of financing flows were undertaken. From these, it is possible to estimate the extent of the private sector participation in financing PAC activities. PAC definitions were revised in 1992 to include street cleaning. This change affects the public sector's investment and current expenditure for waste; revised figures are available only as far back as 1987.

Private household expenditure includes septic tanks, anti-pollution expenditure for motor vehicles, protection against noise, and expenditure for waste (waste bags). The methods used in France, for the time being, do not allow receipts or cost-recovery by industry to be identified.

FRANCE[a] *Millions of francs at 1985 prices*

		Water	Waste	Air	Other	Total	Addendum : R&D (b)
PUBLIC SECTOR							
1981	Investment expenditure	7 801	667	..	500	8 968	..
	+Current expenditure	8 715	6 527	..	-	15 242	..
	-Receipts from	..	..	..	..	..	..
	Expenditure 1	16 516	7 193	..	500	24 209	..
1985	Investment expenditure	5 959	954	..	470	7 383	..
	+Current expenditure	10 098	8 372	..	-	18 470	..
	-Receipts from	..	..	..	..	..	..
	Expenditure 1	16 057	9 326	..	470	25 853	320
1987	Investment expenditure	6 344	1 554	-	482	8 380	..
	+Current expenditure	10 582	16 149	-	-	26 731	..
	-Receipts from	..	..	..	..	..	..
	Expenditure 1	16 926	17 703	-	482	35 111	689
1990	Investment expenditure	6 160	1 367	..	516	8 044	..
	+Current expenditure	11 115	16 328	..	-	27 443	..
	-Receipts from	..	..	..	..	..	..
	Expenditure 1	17 275	17 695	..	516	35 487	..
BUSINESS SECTOR							
1981	Investment expenditure	1 989	567	2 067	766	5 390	..
	+Current expenditure	3 046	2 989	2 506	-	8 541	..
	-Receipts from	..	..	..	..	..	..
	Expenditure 1	5 035	3 556	4 573	766	13 931	..
1985	Investment expenditure	1 216	535	1 575	593	3 919	..
	+Current expenditure	3 497	3 527	3 003	-	10 027	..
	-Receipts from	..	..	..	..	..	..
	Expenditure 1	4 713	4 062	4 578	593	13 946	..
1987	Investment expenditure	1 235	572	5 209	253	7 269	..
	+Current expenditure	3 184	1 290	3 367	103	7 945	..
	-Receipts from	..	..	..	..	..	..
	Expenditure 1	4 419	1 862	8 576	356	15 213	..
1990	Investment expenditure	1 929	714	1 670	691	5 004	..
	+Current expenditure	4 693	5 233	3 890	-	13 815	..
	-Receipts from	..	..	..	..	..	..
	Expenditure 1	6 622	5 947	5 560	691	18 819	..
PRIVATE HOUSEHOLDS							
1985	Expenditure 1	3 389	1 047	..	860	5 296	..
1987	Expenditure 1	3 373	1 097	504	987	5 961	..
1990	Expenditure 1	3 520	1 251	750	1 056	6 577	..

a) Definitions and methodological notes are on page 26
b) Source: OECD Basic Science and Technology Statistic.

Source: OECD

Price Index	Used to deflate	198	1985	1987	1990
Gross fixed capital formation	Investment expenditure by the public and business	74.	100.	106.	114.3
Government final consumption	Public sector current expenditure	71.	100.	108.	115.4
GDP	Business sector current expenditure	71.	100.	108.	119.5
Private final consumption expenditure	Household expenditure	71.	100.	106.	113.3

GERMANY

Sources and definition

In Germany, surveys of the business community have been conducted annually since 1975 in order to evaluate PAC investment expenditure (Statistisches Bundesamt, 1991). In addition, estimates are carried out for industrial current expenditure, as well as the current and investment expenditure of the public sector (Statistisches Bundesamt, 1990). PAC expenditure figures relate to western Germany only.

PAC investment expenditure is defined as i) expenditure for capital goods to protect from environmental damage and nuisance arising from the production process; ii) expenditure for capital goods in order to produce more environmentally friendly products. The inclusion of the latter item distinguishes German statistics from other national sources. The possible bias appears to remain small, however, as the item accounts for less than one per cent of overall PAC investment expenditure in industry.

PAC expenditure is defined as expenditure directly related to the protection of the environment. In the context of expenditure for clean products, only the part of expenditure which is incurred in response to environmental regulation is included.

Characteristic activities and environmental media

German expenditure statistics cover expenditure for direct pollution abatement and control, monitoring and control, and R&D. Survey-based investment expenditure includes expenditure for end-of-pipe technologies as well as the additional cost incurred for integrated, environmentally benign technologies.

The following environmental media are covered: water, air, treatment and removal of waste, and protection against noise. Excluded is investment expenditure incurred for reasons of safety in the workplace.

Economic sectors

Public PAC expenditure includes the different levels of government. Industrial PAC expenditure covers quarrying and mining, manufacturing and utilities. No expenditure figures are available for other industries, i.e. construction, transport and services and for private households. Business sector receipts from the sales of PAC by-products are not identified and therefore not netted out from expenditure. Industry PAC investment expenditure figures are evaluated according to the abater principle. At the two- and three-digit levels of ISIC, only investment expenditure figures are available.

Additional data

The Federal Statistical Office also publishes the receipts of the public sector from environmental services, as well as the volume of private sector capital expenditure that qualified for investment tax incentives.

GERMANY[a] *Millions of DM at 1985 prices*

		Water	Waste	Air	Other	Total	Addendum: R&D[b]
PUBLIC SECTOR							
1980	Investment expenditure	8 514	538	14	175	9 241	..
	+Current expenditure	2 306	3 104	7	-	5 418	..
	-Receipts from by-products	..	..	..	..	..	..
	Expenditure 1	10 820	3 642	21	175	14 658	395
1985	Investment expenditure	5 955	547	19	228	6 749	..
	+Current expenditure	3 126	3 290	14	-	6 430	..
	-Receipts from by-products	..	..	..	..	..	..
	Expenditure 1	9 081	3 837	33	228	13 179	662
1989	Investment expenditure	7 006	1 165	35	276	8 483	..
	+Current expenditure	3 543	4 090	18	-	7 651	..
	-Receipts from by-products	..	..	..	..	..	..
	Expenditure 1	10 549	5 255	54	276	16 134	735
BUSINESS SECTOR: TOTAL EXPENDITURE							
1980	Investment expenditure	1 041	247	1 479	280	3 047	..
	+Current expenditure	3 644	1 342	2 924	113	8 023	..
	-Receipts from by-products	..	..	..	..	..	..
	Expenditure 1	4 686	1 588	4 403	393	11 070	..
1985	Investment expenditure	1 061	328	3 973	263	5 625	..
	+Current expenditure	3 335	1 443	2 944	100	7 822	..
	-Receipts from by-products	..	..	..	..	..	..
	Expenditure 1	4 396	1 771	6 917	363	13 447	..
1989	Investment expenditure	1 821	663	4 397	246	7 126	..
	+Current expenditure	3 556	1 565	4 280	112	9 513	..
	-Receipts from by-products	..	..	..	..	..	..
	Expenditure 1	5 377	2 228	8 677	358	16 639	..

a) Definitions and methodological notes are on page 28
b) Source: OECD Basic Science and Technology Statistic.

Source: OECD

Price Index	Used to deflate	1980	1985	1989
Gross fixed capital formation	Investment expenditure by the public and	87.2	100.0	107.1
Government final consumption	Public sector current expenditure	86.2	100.0	109.4
GDP	Business sector current expenditure	64.4	100.0	109.7

GERMANY *Millions of DM at 1985 prices*

		Water	Waste	Air	Other	Total
BUSINESS SECTOR: INDUSTRY BRANCHES (1989)						
Mining and quarrying						
	Investment expenditure	69	21	513	6	608
	+Current expenditure	106	90	273	7	476
	-Receipts from by-products	..	..	..	..	..
	Expenditure 1	175	111	785	13	1 084
Electricity, gas, water						
	Investment expenditure	211	142	1 967	56	2 376
	+Current expenditure	459	280	1 741	18	2 498
	-Receipts from by-products	..	..	..	..	..
	Expenditure 1	670	422	3 708	74	4 874
Construction						
	Investment expenditure	7	20	20	11	57
	+Current expenditure	3	28	20	7	58
	-Receipts from by-products	..	..	..	..	..
	Expenditure 1	9	48	40	18	115
Total manufacturing						
	Investment expenditure	1 534	481	1 897	173	4 085
	+Current expenditure	2 989	1 167	2 246	79	6 481
	-Receipts from by-products	..	..	..	..	..
	Expenditure 1	4 523	1 648	4 143	252	10 566
Investment Expenditure: selected manufacturing industries						
ISIC 31	Food and tobacco	77	31	79	18	205
ISIC 32	Textiles and leather	23	11	25	4	63
ISIC 33	Wood and wood products	7	13	58	3	80
ISIC 34	Pulp and paper	139	114	67	7	328
ISIC 35	Chemicals	869	216	801	37	1 923
ISIC 36	Non-metallic mineral products	22	13	135	21	191
ISIC 37	Iron and steel	97	15	259	19	389
ISIC 38	Machinery	277	62	459	63	861
ISIC 39	Other	7	-	1	-	7

ITALY

Sources and definition

In Italy, the first estimates of public environmental expenditure were presented in the 1989 Report on the State of the Environment. These were based on a study carried out by the Research Institute for Economic Planning (ISPE), which was initiated by the Ministry for the Environment. Since then, both the Italian National Statistical Office (ISTAT) and ISPE have proceeded to update and to develop environmental expenditure statistics. The most recent data were published in the 1991/92 Report on the State of the Environment in Italy. Environmental expenditure is defined as all expenditure targeted at the conservation and rehabilitation of the environment.

Characteristic activities and environmental media

The Italian Environment Ministry adjusted its general environmental expenditure figures in order to correspond as closely as possible to the OECD questionnaire. The following environmental media are included in PAC expenditure tables for Italy: wastewater treatment, air pollution control, conservation of soil and hydrological systems, waste disposal, and noise protection.

Economic sectors

Only public sector expenditure figures are available. Included in these is the expenditure by the central government, the regional governments, and the Agency for the Promotion of the Development of Southern Italy. Subsidies for environmental purposes are included in investment and current expenditure; however, no information is available on government revenues from fees and charges for environmental purposes.

ITALY[a] *Billion lire at 1985 prices*

		Water	Waste	Air	Other	Total	Addendum: R&D[b]
PUBLIC SECTOR							
1988	Investment expenditure	1 890	79	-	-	1 969	..
	+Current expenditure	395	3	-	-	398	..
	-Receipts from by-products	-	-	-	-	-	..
	Expenditure 1	2 285	82	-	-	2 367	..
1989	Investment expenditure	1 742	154	-	-	1 896	..
	+Current expenditure	313	4	-	-	317	..
	-Receipts from by-products	-	-	-	-	-	..
	Expenditure 1	2 055	157	-	-	2 213	131

a) Definitions and methodological notes are on page 32
b) Source: OECD Basic Science and Technology Statistics.

Source: OECD

Price Index	Used to deflate	1985	1988	1989
Gross fixed capital formation	Public sector investment	100.0	114.0	119.8
Government final consumption expenditure	Public sector current expenditure	100.0	126.7	135.9

NETHERLANDS

Sources and definition

The Netherlands Central Statistical Office has been conducting surveys on environmental expenditure for a number of years. In 1979, the Central Statistical Office conducted a special survey to provide a basis for the annual investment surveys that have been carried out since then. Estimation methods are used to update survey results for current PAC expenditure. These data are published along with other environmental statistics (Centraal Bureau voor de statistiek, 1990 and 1989).

PAC activity is defined as the reduction of the flow of emissions and waste arising from production processes and from consumption activities. PAC expenditure relates to measures which would not have been introduced in the absence of environmental considerations.

Characteristic activities and environmental media

The following characteristic activities are covered: direct pollution abatement and control, regulation and monitoring, co-ordination of PAC activities, and R&D. Investment expenditure comprise end-of-pipe technologies as well as expenditure for pollution control that is integrated in new technologies. Only part of the purchase value of environmentally friendly capital goods is classified as PAC expenditure; this is the proportion that is, for environmental reasons, in excess of the alternative value of normal equipment. Expenditure for the development of clean products is explicitly excluded.

Environmental media comprise waste, surface water, groundwater, soil, air and noise.

Economic sectors

Public PAC expenditure include expenditure by the central government, provinces, water boards, municipalities and inter-municipal corporations. Private household expenditure includes additional expenditure for phosphate-free washing-powder and additional expenditure for low-sulphur burning materials.

A major concern of the Netherlands' statistical approach towards PAC expenditure is to trace financial flows associated with pollution control. The amount of transfers, subsidies, and payments in exchange for environmental services is evaluated. Therefore, expenditure data are available according to both the abater principle and the financing principle.

NETHERLANDS[a] *Millions of guilders at 1985 prices*

		Water	Waste	Air	Other	Total	Addendum: R&D[b]
PUBLIC SECTOR							
1985	Investment expenditure	1 602	120	1	6	1 729	..
	+Current expenditure	1 109	1 079	46	482	2 716	..
	-Receipts from	18	88	-	-	106	..
	Expenditure 1	2 693	1 111	47	488	4 339	125
	+Subsidies	61	9	55	66	191	..
	-Fees	1 367	746	93	125	2 331	..
	Expenditure 2	1 387	374	9	429	2 199	..
1989	Investment expenditure	695	279	-	9	983	..
	+Current expenditure	1 384	1 227	66	600	3 276	..
	-Receipts from	19	90	-	2	111	..
	Expenditure 1	2 060	1 416	66	606	4 148	162
	+Subsidies	98	6	36	11	151	..
	-Fees	1 715	1 049	2	405	3 171	..
	Expenditure 2	442	373	100	212	1 128	..
BUSINESS SECTOR: TOTAL EXPENDITURE							
1985[c]	Investment	232	48	333	214	827	..
	+Current expenditure	279	211	302	204	996	..
	-Receipts from	-	-	-	-	-	..
	Expenditure 1	511	259	635	418	1 823	..
	-Subsidies	61	9	55	67	192	..
	+Fees	438	292	42	80	852	..
	Expenditure 2	888	542	622	431	2 483	..
1989	Investment	360	129	509	256	1 254	..
	+Current expenditure	410	271	394	285	1 360	..
	-Receipts from	-	-	-	-	-	..
	Expenditure 1	770	400	903	540	2 614	..
	-Subsidies	97	6	37	11	150	..
	+Fees	550	462	2	253	1 267	..
	Expenditure 2	1 224	857	868	783	3 731	..
PRIVATE HOUSEHOLDS							
1985	Expenditure 1	10	-	63	-	73	..
	-Subsidies	-	-	-	-	-	..
	+Fees	929	453	51	45	1 478	..
	Expenditure 2	939	453	114	45	1 551	..
1989	Expenditure 1	-	-	491	-	491	..
	-Subsidies	-	-	-	-	-	..
	+Fees	1 145	578	-	146	1 869	..
	Expenditure 2	1 145	578	491	146	2 360	..

a) Definitions and methodological notes are on page 34
b) Source: OECD Basic Science and Technology Statistics
c) Excludes agriculture.

Source: OECD

Price Index	Used to deflate	1985	1989	1990
Gross fixed capital formation	Investment expenditure by the public and private sectors	100.0	104.5	106.3
Government final consumption	Public sector current expenditure	100.0	102.2	106.0
GDP	Business sector current expenditure	100.0	103.6	106.6

Private final consumption	Household expenditure	100.0	103.1	105.9

NETHERLANDS[a] *Millions of guilders at 1985 prices*

	Water	Waste	Air	Other	Total
BUSINESS SECTOR: INDUSTRY BRANCHES (1989)					
Agriculture, hunting, fishing and forestry					
Investment expenditure	63	25	34	11	133
+Current expenditure	108	19	9	18	154
-Receipts from by-products	-	-	-	-	-
Expenditure 1	171	44	43	29	287
-Subsidies	45	-	3	3	51
+Fees	42	-	-	4	46
Expenditure 2	168	44	40	30	283
Mining and quarrying					
Investment expenditure	11	15	3	11	40
+Current expenditure	37	14	8	20	78
-Receipts from by-products	-	-	-	-	-
Expenditure 1	48	29	11	31	118
-Subsidies	-	-	1	-	1
+Fees	3	37	-	5	44
Expenditure 2	51	66	10	36	162
Electricity, gas, water					
Investment expenditure	4	2	185	14	205
+Current expenditure	7	4	79	24	114
-Receipts from by-products	-	-	-	-	-
Expenditure 1	11	6	264	38	319
-Subsidies	-	-	-	-	-
+Fees	2	12	-	54	68
Expenditure 2	13	17	264	93	386
Construction					
Investment expenditure	1	62	-	2	65
+Current expenditure	11	128	2	-	141
-Receipts from by-products	-	-	-	-	-
Expenditure 1	12	191	2	2	206
-Subsidies	-	-	-	-	-
+Fees	22	15	-	5	42
Expenditure 2	34	206	2	7	248
Transport, storage, communication					
Investment expenditure	29	-	112	168	309
+Current expenditure	30	13	97	56	196
-Receipts from by-products	-	-	-	-	-
Expenditure 1	59	13	209	224	505
-Subsidies	-	-	-	5	5
+Fees	23	16	-	101	141
Expenditure 2	82	29	209	321	641
Total manufacturing					
Investment expenditure	594	62	391	13	1 061
+Current expenditure	358	109	214	192	874
-Receipts from by-products	-	-	-	-	-
Expenditure 1	952	171	606	205	1 935
-Subsidies	70	3	61	2	136
+Fees	252	266	-	98	617
Expenditure 2	1 134	435	545	302	2 415
Expenditure 1: selected manufacturing industries (1990)					
ISIC 31 Food and tobacco	179	17	46	24	283
ISIC 32 Textiles and leather	4	6	3	5	17
ISIC 33 Wood and wood products	2	4	3	2	10
ISIC 34 Pulp and paper	39	11	12	4	66
ISIC 35 Chemicals	632	89	335	111	1 167
ISIC 36 Non-metallic mineral	6	8	22	4	39
ISIC 37 Iron and steel	13	9	152	21	195

ISIC 38	Machinery	57	22	18	28	125

PORTUGAL

Sources and definition

In Portugal, PAC expenditure statistics are developed in the Ministry for Environment; first results concern the years 1988 and 1989. The methodology applied is based on the OECD questionnaire, which is also compatible with the system of the European Communities (SERIEE). Detailed results covering the entire area of environmental protection and a methodological discussion are given by Ribeiro (1992).

Characteristic activities and environmental media

R&D expenditure is only included to the extent that they present projects preceding environmental investment activity or studies carried out by the central administration.

Environmental media cover water, air, noise and waste. The category of "other" expenditure includes all overhead expenses for PAC purposes, which cannot be allocated to a particular medium.

Economic sectors

Public sector expenditure includes expenditure at the central government level, at the departmental level and at the municipality level. Expenditure by municipalities are based on a survey among municipalities. Business sector expenditure comprises the main branches: mining, food, textiles and leather, chemicals, machinery, iron and steel, non-ferrous metals, wood, pulp and paper, and utilities (gas, water, and electricity). Only investment expenditure is available for the time being. Private household direct expenditure cover air pollution equipment. Fees paid by private households include fees for wastewater treatment and solid waste disposal.

For the main economic sectors, Portuguese statistics allow a distinction between the abater and the financing principles i.e., fees and subsidies for PAC purposes are identified.

PORTUGAL[a] *Millions of escudos at 1985 prices*

	Water	Waste	Air	Other	Total	Addendum: R&D[b]
PUBLIC SECTOR						
1988 Investment	7 815	1 804	124	1 610	11 352	..
+Current expenditure	3 150	1 712	146	3 562	8 570	..
-Receipts from	..	..	..	..	..	..
Expenditure 1	10 965	3 515	270	5 172	19 922	467
+Subsidies	722	262	33	4 467	5 484	..
-Fees	189	81	..	..	270	..
Expenditure 2	11 498	3 697	303	9 639	25 136	..
1989 Investment	8 274	1 835	22	1 181	11 312	..
+Current expenditure	3 229	1 627	117	2 502	7 475	..
-Receipts from	..	..	..	..	..	..
Expenditure 1	11 503	3 462	..	3 682	18 787	444
+Subsidies	1 499	372	94	4 152	6 118	..
-Fees	171	73	..	..	245	..
Expenditure 2	12 831	3 761	94	7 835	24 659	..
BUSINESS SECTOR						
1988 Investment expenditure	322	432	81	5 159	5 993	..
+Current expenditure	..	..	..	..	..	..
-Receipts from	..	..	..	..	..	..
Expenditure 1	..	..	..	..	..	..
1989 Investment expenditure	1 843	763	234	5 097	7 937	..
+Current expenditure	..	..	..	..	..	..
-Receipts from	..	..	..	..	..	..
Expenditure 1	..	..	..	..	..	..
PRIVATE HOUSEHOLDS						
1988 Expenditure 2	204	87	75	..	366	..
1989 Expenditure 2	191	82	75	..	349	..

a) Definitions and methodological notes are on page 38
b) Source: OECD Basic Science and Technology Statistic.

Source: OECD

Price Index	Used to deflate	1985	1988	1989
Gross fixed capital formation	Investment expenditure by the public and business sectors	100.0	143.1	158.4
Government final consumption expenditure	Public sector current expenditure and R&D	100.0	148.7	172.5
GDP	Business sector current expenditure	100.0	149.5	168.9
Private final consumption expenditure	Expenditure by private households	100.0	137.8	154.4

SPAIN

Sources and definition

In Spain, environmental expenditure data have been collected for four consecutive years (1987-1990). These are published by the Ministry for Public Works and Transport (Ministerio de Obras Públicas y Transportes, 1992). In methodological terms, data collection in Spain has closely followed the framework proposed by the SERIEE system of the European Community. As such, consistency is assured with the definitions that are used in the OECD questionnaire.

Characteristic activities and environmental media

Characteristic activities are direct PAC for the following environmental media: air, industrial and household waste, noise, soil, surface water and groundwater. Expenditure is further desegregated into current and investment expenditure. Current expenditure is directed towards personnel, characteristic goods and services, and interest payments.

Economic sectors

Only public sector expenditure is available. The public sector includes all levels of government. In the Spanish statistics, it is possible to identify transfer payments from the public sector to the private sector.

SPAIN[a] *Millions of pesetas at 1985 prices*

		Water	Waste	Air	Other	Total	Addendum:
PUBLIC SECTOR							
1987	Investment expenditure	31 214	3 763	1 769	1 383	38 129	..
	+Current expenditure	49 048	54 016	1 983	2 578	107 625	..
	-Receipts from	..	..	..	..	..	..
	Expenditure 1	80 262	57 779	3 752	3 962	145 754	2 222
	+Subsidies	2 049	1 256	304	18	3 627	..
	-Fees	..	..	..	..	..	..
	Expenditure 2	82 310	59 035	4 056	3 980	149 382	..
1989	Investment expenditure	51 892	10 381	5 269	4 013	71 554	..
	+Current expenditure	55 624	71 794	3 619	4 251	135 288	..
	-Receipts from	..	..	..	..	..	..
	Expenditure 1	107 516	82 174	8 888	8 264	206 842	3 586
	+Subsidies	7 246	2 995	505	411	11 157	..
	-Fees	..	..	..	..	..	..
	Expenditure 2	114 762	85 169	9 393	8 675	217 999	..
1990	Investment expenditure	60 075	9 627	1 705	3 234	74 641	..
	+Current expenditure	62 336	73 525	2 430	4 868	143 159	..
	-Receipts from	..	..	..	..	..	..
	Expenditure 1	122 411	83 152	4 135	8 102	217 800	..
	+Subsidies	3 586	4 310	346	215	8 457	..
	-Fees	..	..	..	..	..	..
	Expenditure 2	125 997	87 462	4 480	8 318	226 257	..

a) Definitions and methodological notes are on page 40
b) Source: OECD Basic Science and Technology Statistics.

Source: OECD

Price Index	Used to deflate	1985	1987	1989	1990
Gross fixed capital formation	Public sector investment	100.0	110.7	123.4	131.0
Government final consumption	Public sector current expenditure and	100.0	114.1	126.9	135.6

SWEDEN

Sources and definition

In Sweden, data on PAC are currently available from the surveys in industry for 1981, 1985, and 1988. Some cost statistics are also available for the central government. In the course of 1993, the results of the 1991 surveys of industry and municipalities will also be available. In these surveys, PAC expenditure is defined as investment and current expenditure to purify and control emissions.

Characteristic activities and environmental media

In general, public and business sector data cover the treatment and collection of wastewater and solid waste, as well as air and noise.

Public sector data are based on the expenditure of the central, regional and local governments. The figures for water refer to budget appropriations. Those for solid waste refer to estimated expenditure associated with the collection and treatment of household, industrial, and hazardous waste. Data for air refer only to the abatement of SO_X emissions. The "other" expenditure is largely comprised of expenditure on the administration of municipal environmental programmes, along with activities related to controlling noise pollution. It is noted that investment expenditure statistics are not always available and capital costs are used in their place. In some cases, this substitution may significantly underestimate the true investment expenditure for a given year.

Business sector investment expenditure includes new capital purchases, as well as the modification or replacement of process technologies if those adjustments result in reduced environmental pollution. Data reported for current expenditure by the business sector are concerned with the operation of environmental equipment and pollution control programs; expenditure on training and technical development is also included. The industry survey explicitly omits the following: investments to improve the quality of the workplace, interest payments on capital purchases, fines related to infractions of environmental regulations, and expenditure on remediation.

Economic sectors

In the following tables, PAC expenditure in Sweden is presented by sector (public and business) and by environmental medium. While it is expected that its effects are likely to be minimal, it should be noted that some degree of double-counting does occur. This issue should be considered when interpreting the figures on the treatment of sewage and solid waste, as these are cases where the business sector pays for services that are performed by the public sector. At the moment, there are no data available for the PAC expenditure of private households.

SWEDEN[a] *Millions of kroner at 1985 prices*

		Water	Waste	Air	Other[c]	Total	Addendum: R&D[b]
PUBLIC SECTOR							
1979	Investment expenditure	454	373	68	10	904	..
	+Current expenditure	..	..	..	..	..	..
	-Receipts from by-products	..	..	..	..	..	..
	Expenditure 1	..	..	..	..	..	..
1986	Investment expenditure	1 104	672	109	22	1 906	..
	+Current expenditure	1 711	1 659	178	397	3 945	..
	-Receipts from by-products	..	..	..	..	..	..
	Expenditure 1	2 815	2 331	286	418	5 851	176
	+Subsidies	-	-	96	-	96	..
	-Fees	2 581	1 625	-	38	4 245	..
	Expenditure 2	234	706	382	421	1 742	..
BUSINESS SECTOR							
1981	Investment expenditure	229	..	278	127	634	..
	+Current expenditure	..	..	..	..	..	..
	-Receipts from by-products	..	..	..	..	..	..
	Expenditure 1	..	..	..	..	..	..
1985	Investment expenditure	479	22	634	55	1 190	..
	+Current expenditure	..	..	..	..	1 473	..
	-Receipts from by-products	..	..	..	..	..	..
	Expenditure 1	..	..	..	..	2 663	..
1988	Investment expenditure	1 097	..	878	219	2 193	..
	+Current expenditure	..	..	..	..	1 485	..
	-Receipts from by-products	..	..	..	..	..	..
	Expenditure 1	..	..	..	..	3 679	..

a) Definitions and methodological notes are on page 42
b) Source: OECD Basic Science and Technology Statistics
c) 1981 and 1988 data may include expenditure on waste.

Source: OECD

Price Index	Used to deflate	1979	1981	1985	1986	1988
Gross fixed capital	Investment expenditure by the public and	61.7	75.5	100.0	104.1	116.8
Government final	Public sector current expenditure	55.8	70.5	100.0	104.6	116.4
GDP	Business sector current expenditure	59.8	73.2	100.0	106.8	119.3

SWITZERLAND

Sources and definition

PAC expenditure data for the public sector is available from the Ministry of Finance. These figures are based on public finance statistics, which have been collected since 1970 and are detailed by function. Although figures for private sector PAC expenditure are not currently being compiled, there are plans to initiate a survey for this area.

Characteristic activities and environmental media

Wastewater collection and treatment, along with the collection and disposal of solid waste, are the principal PAC activities. Switzerland also reports a category of "other" expenditure, which is comprised of measures to control air and noise pollution.

Economic sectors

The public sector statistics account for PAC activities at all levels of administration, i.e. the federal government, the cantons, and the communities. Their reporting method already controls for double-counting. However, only a total figure for PAC (Expenditure 1) is given; there is no disaggregation of current and investment expenditure.

SWITZERLAND *Millions of francs at 1985 prices*

		Water	Waste	Air	Other	Total	Addendum: R&D[a]
PUBLIC SECTOR							
1980	Investment expenditure	..	..	..	..	..	..
	+Current expenditure	..	..	..	..	..	..
	-Receipts from	..	..	..	..	..	..
	Expenditure 1	1 288	342	28	-	1 658	..
1985	Investment expenditure	..	..	..	..	..	..
	+Current expenditure	..	..	..	..	..	..
	-Receipts from	..	..	..	..	..	..
	Expenditure 1	1 098	455	11	-	1 564	41
1989	Investment expenditure	..	..	..	..	..	..
	+Current expenditure	..	..	..	..	..	..
	-Receipts from	..	..	..	..	..	..
	Expenditure 1	1 249	792	71	-	2 111	..

a) Source: OECD Basic Science and Technology Statistics.

Source: OECD

Price Index	Used to deflate	1980	1985	1989
Government final consumption expenditure	Expenditure 1	80.1	100.0	108.6

UNITED KINGDOM

Sources and definition

The United Kingdom has recently started to collect PAC expenditure statistics. Estimates of 1990 expenditure are based largely on a study commissioned for the Department of the Environment. These results are based on a combination of published information and market research. Some estimates are also provided which are consistent with previous replies to the OECD questionnaire.

PAC statistics must be considered as orders of magnitude only. Figures have been rounded to the nearest £10 million but the overall estimate in a given year may be subject to an error band of ±10 per cent. Institutional changes during the 1980s (particularly, the privatisation of water and electricity supply industries) also make temporal comparisons of public or private expenditure nearly impossible.

Characteristic activities and environmental media

Definitions of characteristic activities correspond as closely as possible to OECD definitions. In particular, expenditure relating to nature conservation, mobilisation of natural resources (e.g. drinking water supply), improvement of amenities, training and education has been excluded. Public sector air expenditure include central and local authority grant aid to householders who are affected by smoke control orders, as well as inspection and monitoring costs. Public sector noise expenditure estimates include the enforcement of noise abatement regulations, which are intended to compensate for increased highway and aircraft noise and assistance with soundproofing. "Other" expenditure refers to the costs of reclaiming derelict land, including the restoration of mineral workings and the general administrative costs with respect to pollution control.

Economic sectors

For the fiscal year 1985/86, no private household expenditure data are available. For UK manufacturing abatement expenditure in 1988, figures represent first-order estimates only. Information on transfer payments between the public and private sector are not generally available so that UK entries are confined to recording PAC expenditure according to the abater principle. Private household expenditure is available.

In 1989, public water authorities in England and Wales became privately owned companies; water authorities in Scotland and Northern Ireland remain public. Entries as private or public expenditure have been carried out accordingly.

UNITED KINGDOM[a] *Millions of pounds sterling at 1985 prices*

		Water	Waste	Air	Other	Total	Addendum: R&D[b]
PUBLIC SECTOR							
1985	Investment expenditure	..	..	..	..	..	..
	+Current expenditure	..	..	..	..	..	..
	-Receipts from	..	..	..	..	..	..
	Expenditure 1	1 330	1 000	20	30	2 380	53
1990	Investment expenditure	84	..	-	76	159	..
	+Current expenditure	189	..	22	413	624	..
	-Receipts from	..	..	..	..	..	..
	Expenditure 1	272	840	22	489	1 672	53
BUSINESS SECTOR: TOTAL EXPENDITURE							
1985	Investment expenditure	..	..	..	..	..	..
	+Current expenditure	..	..	..	..	..	..
	-Receipts from	..	..	..	..	..	..
	Expenditure 1	390	550	1 140	110	2 190	..
1990	Investment expenditure	1 109	..	683	30	..	..
	+Current expenditure	1 006	..	651	189	..	..
	-Receipts from	..	..	..	..	..	..
	Expenditure 1	2 115	..	1 334	219	3 668	..
PRIVATE HOUSEHOLDS							
1990	Expenditure 1	..	289	23	219	531	..

a) Definitions and methodological notes are on page 46
b) Source: OECD Basic Science and Technology Statistics
c) Expenditure by industry branches were deflated with the GDP price index.

Source: OECD

Price Index	Used to deflate[c]	1980	1985	1990
Gross fixed capital formation	Investment expenditure by the public and business	77.8	100.0	131.7
Government final consumption	Public sector current expenditure	68.9	100.0	137.9
GDP	Business sector current expenditure	71.7	100.0	132.2
Private final consumption	Household expenditure	71.4	100.0	128.0

UNITED KINGDOM *Millions of pounds sterling at 1985 prices*

		Water	Waste	Air	Other	Total
BUSINESS SECTOR: INDUSTRY BRANCHES (1990)						
Agriculture, hunting, fishing						
	Investment expenditure	-	..	-	..	..
	+Current expenditure	-	..	-	..	..
	-Receipts from by-products	-	..	-	..	..
	Expenditure 1	-	61	-	..	61
Mining and quarrying						
	Investment expenditure	-	-	-	..	..
	+Current expenditure	-	-	-	..	..
	-Receipts from by-products	-	-	-	..	..
	Expenditure 1	-	-	-	15	15
Electricity, gas, water						
	Investment expenditure	..	..	..	-	..
	+Current expenditure	..	..	..	-	..
	-Receipts from by-products	..	..	..	-	..
	Expenditure 1	15	8	386	-	408
Total manufacturing						
	Investment expenditure	..	..	..	..	1 036
	+Current expenditure	..	..	..	..	1 036
	-Receipts from by-products	..	..	..	..	..
	Expenditure 1	431	507	946	189	2 073
Investment and current expenditure: selected manufacturing industries						
ISIC 31	Food and tobacco	61	68	136	..	295
ISIC 32	Textiles and leather	15	15	23	..	53
ISIC 33	Wood and wood products	8	15	23	..	53
ISIC 34	Pulp and paper	53	61	113	..	250
ISIC 35	Chemicals	106	121	219	..	484
ISIC 36	Non-metallic mineral products	15	15	38	..	76
ISIC 37	Iron and steel	76	91	166	..	371
ISIC 38	Machinery	53	68	121	..	265
ISIC 39	Other	45	53	106	..	227

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