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Environmental taxes by economic activities

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Preface

The project on Environmental taxes by economic activities started in January 2011. The project was accomplished in Environment and Energy unit of Statistics Finland. The work benefited from financial support of the European Commission. Eurostat's statistical guide on environmental taxes was a helpful tool for the work.

Time series of environmental taxes and this technical implementation report were compiled by Niina Autio, who also built the method for calculation of the taxes by branches of industry according to Eurostat questionnaire on environmental taxes. A group of experts on environmental accounts, energy statistics, national accounts supply-use tables and public finance sector supported project leader Autio in Her work.

The project leader wishes to thank the expert group and the steering group for their competent input to the project. Special thanks are due to Kristiina Nieminen who helped with SAS Enterprise Guide and Markku Räty who collected the data from supply and use tables and patiently answered plenty of questions regarding the data.

It should be noted, that time series 1995-2008 on environmental taxes by economic activities are not at this stage official statistics of Statistics Finland.

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Executive summary

Statistics on environmental and energy taxes in Finland at national level are available from 1980 onwards. In this project a methodology was developed for regular production of statistics on environmental taxes by economic activities. Accounts for years 1995-2008 were compiled. These accounts complement the National accounts with environmental information, and meet the requirements of the Module for environmentally related taxes by economic activity of the Regulation of European environmental economic accounts.

In 2008 households paid more than one third of all environmental taxes in Finland. From transport taxes the share of households was 50 percent, from energy taxes 28 percent and from pollution taxes 16 percent. The transport sector paid 19 percent and the manufacturing industry 11 percent of total environmental taxes. Other sectors whose share of total environmental taxes in Finland was more than four percent were Wholesale and retail trade, Real estate activities, Administrative and support service activities and Electricity, gas, steam and air conditioning supply.

During 1995-2008 revenues from environmental taxes have increased almost 80 percent from the 1995 level. In the latest years of the period revenues from transport taxes have decreased, as well as the share of household from all environmental taxes.

The most part of environmental taxes in Finland are related to energy and transport. Air emission accounts and environmental taxes by economic activities together contain a great amount of detailed information that can be used in analysing development of relationship between environmental taxation and emissions to air. Development of energy accounts will support and expand these analysis.

Environmental taxes by economic activity are fully consistent with statistics provided by the National accounts. Information on environmental taxes is directly comparable with other monetary information compiled and presented in the framework of National accounting, such as production, value added and intermediate consumption.

The methodology for regular production of statistics on environmental taxes by economic activities is created and it is ready for regular production of annual statistics according to the regulation on environmental accounts. Quality and reliability of time series at NACE A*64 level are adequate for the use in Eurostat and publication in Finland. The main improvements to accounts on environmental taxes will focus on tax concession of manufacturing industry and on vehicle tax, for which the data since 2004 will be sourced from Finnish Transport Safety Agency.

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1. Purpose, need and background

Environmentally related taxes by economic activity is one of the modules in the REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on European environmental accounts (EU) N:o 691/2011. According to the regulation, statistics on environmental taxes by economic activities on years 2008-2011 should be reported to Eurostat in September 2013.

Statistics on environmental and energy taxes in Finland at national level are available from 1980 onwards. These statistics have been published in Environment Statistics Yearbooks since 2000. In the definition of environment-related taxes and charges, a tax or charge is to be directed to some measurable physical quantity that has a harmful environmental effect. The central issue is not the nature of taxes but the basis of taxation.

Environmental taxes are levied on motor fuels, such as motor petrol and diesel oil and other energy products, i.e. light and heavy fuel oil, coal, peat, natural gas and electricity, which is taxed on the basis of consumption. Vehicle-based environmental taxes include automobile tax, vehicle tax and motor vehicle tax, which was connected to vehicle tax in 2004. Agricultural environmental taxes comprise pesticide charge, which was levied until 2007 and fertiliser tax, which was levied until 1994. Other environment-related taxes are a surtax on alcoholic and soft drink taxes levied up to 2004, environmental tax on beverage packaging levied since 2005, waste tax, water protection charge, oil waste charge, oil pollution charge, and charter flight tax levied between 1992 and 1994. Environment-related service charges include water and wastewater charges and waste disposal and management charges.

Environmental taxation is the main economic method of steering environmental protection in Finland. Altogether EUR 5.0 billion was raised as environment-related taxes and charges, and about EUR 1.0 billion was collected as various environment-related service charges in 2010. The share of taxes on motor fuels and other energy products was 65 percent of total environmental taxes, and the share of vehicle-related taxes was 33 percent. Environment-related taxes and charges accounted for 6.6 per cent of all tax revenues and compulsory social security contributions on Finland.

Although the totals of environment-related taxes are reported annually at national economy level, statistics on these taxes by economic activities (NACE sectors) haven't been compiled or published in Finland. The object of this project was to develop the methodology for regular production of statistics on environmental taxes by economic activities to complement the National accounts framework with some environmental information.

The methodology and time series for the years 1995 - 2008 follows categories and characteristics of environmental taxes as they are de-

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fined in the national accounts (ESA) and in the regulation on environmental accounts. Time series for 1995 - 2007 are presented according to the classification of economic activities NACE Rev. 1 and the year 2008 according to the NACE Rev. 2.

Experience and expertise achieved in a Finnish project on NAMEA air methodology and time series supported the action on environmental taxes. This experience was especially important in disaggregating data on environmental taxes into individual branches of industry by using data and information provided by supply-use tables of the National accounts.

2. Project organisation

Project group:

- Niina Autio, project leader and principal researcher
- Tuula Kyllönen, expert on environmental taxes
- Eila Salomaa, expert on monetary environmental accounts
- Martti Pykäri, expert on monetary environmental accounts
- Kirsi-Marja Aalto, expert on energy statistics
- Markku Räty, expert on national accounts supply-use tables
- Niina Suutarinen, expert on taxes in national accounts
- Jukka Muukkonen, expert on environmental accounts

Steering group supervising the project:

- Ville Vertanen, chair, head of Environment and Energy
- Matti Okko, head of Government and Sector Accounts
- Leo Kolttola, senior advisor on Environment and Energy
- Jukka Muukkonen, environmental accounting team
- Niina Autio, secretary of the steering group

The project group met 7 times and the steering group met 6 times during the project. Several additional meetings with group members subject of the more detailed issue in concern were held as well. The issues treated and decisions made in project group and steering group were reported in minutes of the meetings.

National Accounts at Statistics Finland supported the work by expertise and data on national accounts, input-output tables and supplyuse tables. Department of IT and Statistical methods at Statistics Finland supported the work by expertise on SAS Enterprise Guide programming.

Statistics on environmental taxes by economic activity are based on a legal act and that is why this project is on an area of interest also at the external entities. Interest groups at the national level are e.g. the Ministry of Environment, the Ministry of Finance, Finnish Environment Institute, The Research Institute of the Finnish Economy (ETLA) and Government Institute for Economic Research (VATT).

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3. Environmental taxes by economic activities in Finland 1995-2008

3.1. Comparison between environmental taxes by economic activities and at national economy level

Difference between previously published environmental taxes at national level and taxes disaggregated to branches of industry (NACE A*64) are presented in table 3.1. Environment-related service charges such as water and wastewater charges and waste disposal and management charges are not included into this table.

Table 3.1. Difference between calculations at national level and by economic activities

	Env. Taxes total	Energy taxes	Pollution taxes	Transport taxes						
	Percentage of	Percentage of previously published figures								
1995	102,0	103,8	37,5	99,7						
1996	97,2	96,5	62,8	99,8						
1997	102,4	104,0	73,7	99,9						
1998	97,9	97,4	79,8	99,9						
1999	100,6	101,5	78,3	99,9						
2000	98,9	98,8	77,9	100,0						
2001	100,1	100,7	73,1	100,1						
2002	100,7	101,8	69,8	100,0						
2003	98,5	98,6	67,7	100,0						
2004	99,3	100,0	64,5	100,0						
2005	99,1	98,5	101,6	100,1						
2006	100,3	100,5	102,7	100,0						
2007	99,8	99,6	102,6	100,0						
2008	99,9	99,8	99,7	100,0						

The most remarkable difference is in pollution taxes, for which the definition used in the Finnish practise on environmental accounting changed in 2005. However, this change had no major effect on the total amount of environmental taxes, because the share of pollution taxes of all environmental taxes in Finland is very small.

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3.2. Summary of environmental taxes by economic activities

Taxes that are included in Finland into Environmental taxes by economic activities are listed in Table 3.2. These taxes are compatible with environmental taxes defined in the Module for environmentally related taxes by economic activity of the Regulation of European environmental economic accounts and in the ESA 95.

Table 3.2. List of environmental taxes in Finland

tax on electric	city and some fuels	
	coal	
	peat	
	natural gas	
	coke	
	electricity	
tax on liquid t	iuels	
	gasoline	
	diesel oil	
	light and heavy fuel oil	
fee of mainte	nance support performance	
ransport tax	es	
car and moto	rcycle tax	
	passenger cars	
	vehicles for goods transportation	
	special motor vehicles	
	motorcycles and sidecars	
vehicle tax		
motor-vehicle	e tax	
Pollution taxe	s	
oil waste fee		
oil pollution fe	ee	
tax on waste		
excise tax on	some beverage packing	
tax on pestici	des	
Resource tax		

In 2008 the share of energy taxes of all environmental taxes in Finland was 65 percent, the share of transport taxes 33 percent, and the share of pollution taxes less than two percent. These shares were about the same than in the beginning of 2000s. Resource taxes are

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not collected in Finland, although discussion and planning on taxation for extraction of sub-soil resources such as e.g. sand and gravel and minerals have taken place.

A summary on environmental taxes by economic activities and by tax categories in 2008 is presented in table 3.3. In the table activities are aggregated from NACE Rev. 2 A*64-level. Detailed data on 2008 at A*64 level and time series 1995-2007 at A*64 level (NACE Rev. 1) are available from the annex (Eurostat standard table for Environmentally related tax revenues by economic activities).

Table 3.3. Environmental taxes in Finland 2008. Million Euros.

NACE code	Economic Activity	Energy taxes	Pollution taxes	Transport taxes	Environmental taxes total
A 01-03	Agriculture, fishing	139,7	0,2	16,3	156,2
B 05-09	Mining and quarrying	25,6	0,0	1,6	27,2
C 10 - C 12	Manufacture of food products, beverages and toba	12,5	0,0	5,7	18,3
C13 - C15	Manufacture of textiles; manufacture of wearing app	0,8	0,0	1,1	2,0
C 16	Manufacture of wood and of products of wood and of	8,2	0,0	1,6	9,8
C 17 - C 18	Manufacture of paper and paper products	67,3	0,1	5,4	72,8
C 19	Manufacture of coke, refined petroleum products	264,7	9,7	1,1	275,4
C 20	Manufacture of chemicals and chemical products	59,1	0,1	1,3	60,5
C 21	Manufacture of basic pharmaceutical products and	0,5	0,0	0,1	0,6
C 22	Manufacture of rubber and plastic products	5,1	0,0	2,3	7,5
C 23	Manufacture of other non-metallic mineral products	8,6	0,1	3,4	12,2
C 24	Manufacture of basic metals	34,6	0,0	1,1	35,7
C 25	Manufacture of fabricated metal products, except m	5,7	0,1	5,0	10,8
C 26 - C 33	Manufacturing nec., recycling'	16,1	0,3	12,5	29,0
D 35	Electricity, gas, steam and air conditioning supply	180,3	0,0	17,8	198,2
E 36 - E 39	Water supply, sewerage, waste management and it	21,9	52,0	15,9	89,7
F 41 - 43	Construction	117,3	0,1	23,9	141,2
G 45 - 47	Wholesale and retail trade; repair of motor vehicles	81,7	0,2	1 44 ,6	226,6
H 49	Land transport, transport via pipelines	536,7	0,7	119,5	656,8
H 50	Water transport	122,7	0,0	1,0	123,7
H 51	Air transport	24,9	0,0	1,0	25,9
H 52 - 53	Transport nec.	128,7	0,3	1,8	130,7
155 - 56	Accomodation and food services activities	9,5	1,9	9,2	20,5
J 58 - J 63	Information and comunication	12,5	0,1	66,3	78,9
K 64-66	Financial and insurance activities	18,1	0,1		18,2
L 68	Real estate activities	197,2	0,1	29,1	226,4
M 69 - M 75	Professional, scientific and technical activities	6,2	0,2	50,5	56,9
N 77- N 82	Administrative and support services activities	45,8	0,2	160,3	206,3
0 84	Public administration and defence; compulsory soc	51,1	0,2	32,5	83,8
P 85	Education	23,4	0,1	14,1	37,6
Q 86 - Q 88	Human Health and social work activities	31,6	0,1	34,8	66,5
R 90 - R 93	Arts, entertainement and recreation	12,8	0,0	23,4	36,1
S 94 -S 96	Other services activities	33,9	0,2	26,0	60,1
НН	Households (incl. T97-98)	915,6	12,6	818,9	1 747,0
A - HH	TOTAL	3 220,4	79,7	1 649,1	4 949,2

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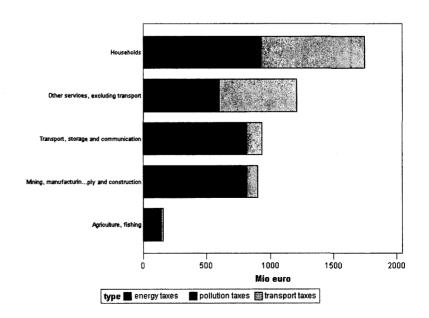
In 2008 households paid more than one third of all environmental taxes in Finland. From transport taxes the share of households was 50 percent, from energy taxes 28 percent and from pollution taxes 16 percent.

The transport sector (NACE H 49-53) paid 19 percent and the manufacturing industry (C 10-33) 11 percent of total environmental taxes. Land transport (H 49) and Manufacture of coke, petroleum products etc. (C 19) had the highest environmental taxes in these sectors. Other sectors whose share of total environmental taxes in Finland was more than four percent were Wholesale and retail trade (G 45-47), Real estate activities (L 68), Administrative and support service activities (N 77-82) and Electricity, gas, steam and air conditioning supply (D 35).

A general view on environmental taxes by tax category and economic activities in 2008 is given in picture 3.1. Pictures 3.2 - 3.4 show the development of total environmental taxes, energy taxes and transport taxes by and economic activities in 1995 - 2008. During this period revenues from environmental taxes have increased almost 80 percent from the 1995 level. In the latest years of the period revenues from transport taxes have decreased, as well as the share of household from all environmental taxes.

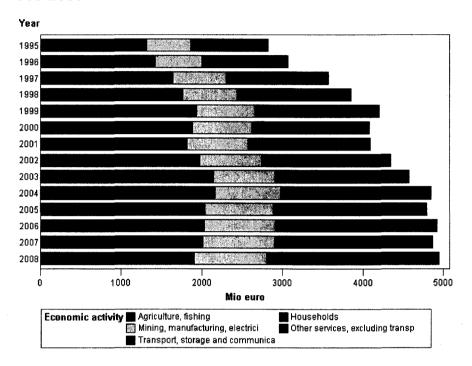
Picture on pollution taxes, which are paid mainly by waste management sector and households is not presented because of their very small share of environmental taxes in Finland. However, importance and volume of these taxes is increasing due to the new law on waste in Finland.

Picture 3.1. Environmental taxes by tax category and economic activity 2008

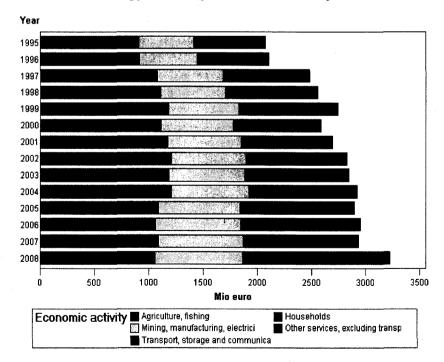


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Picture 3.2. Environmental taxes by economic activity 1995-2008

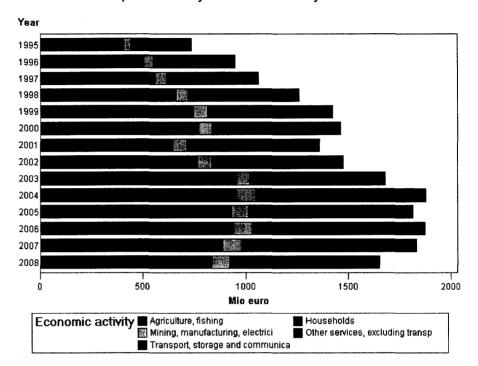


Picture 3.3. Energy taxes by economic activity 1995-2008



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Picture 3.4. Transport taxes by economic activity 1995-2008



4. Data sources

4.1. Supply and use tables of the National accounts

4.1.1. Description

Supply and use tables and the input-output tables based on them describe in detail product flows in the national economy. They are suited for analysing production activity structures and interdependencies between industries. The tables add detail to national accounts and form a coherent framework for describing product flows in the accounts. As the tables are compiled as an integral part of national accounts they also improve the quality of other national accounts data. Supply and use tables describe the supply of products formed by domestic production and imports, and the use of these products as intermediate products in the production of other products and as final products for consumption, capital formation and exports. The actual, symmetrical input-output tables provide a picture of interdependencies between industries, while analysis tables derived from them indicate the importance of the production and final use of different industries to the production and employment in the whole economy.

4.1.2. Data content

The supply tables describe by commodity group production and imports of the goods and services that are produced by different industries and used in the national economy. The use tables describe by

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commodity group the use of these products as intermediate products in different industries and for domestic final use and exports. The description also shows the distribution of expenditure by industry into purchasing of domestic and foreign products, and wages, operating surplus and other value added items.

The input-output tables formed from the supply and use tables examine the use of the outputs of industries as intermediate product inputs and for final use in other industries. Thus, the input-output tables provide a picture of the structure of production activity and the interdependencies between industries. Basing on these interdependencies, input-output models are compiled for studying structural changes in the national economy and evaluating the impact of the changes on e.g. production, imports, inflation and employment.

The concepts and definitions used in the compilation of the supply and use tables and the input-output tables are based on the European System of Accounts (ESA 1995) and the UN's congruent System of National Accounts 1993 (Handbook of Input-Output Table Compilation and Analysis 1999).

The data is public.

4.1.3. Classifications used

The industrial classification used in the supply and use tables and in the input-output tables for the years 1995 to 2007 is a classification based on the Standard Industrial Classification TOL 2002 used in national accounts, while the product classification used is one based on the EU's classification by activity (CPA). The published tables cover 60 industry and product groups.

Starting from the statistical reference year 2008, the industrial classification used for supply and use tables and input-output tables is the national accounts classification based on TOL 2008 and the product classification is one based on the EU's industry-specific product classification (CPA 2008). The tables to be published have 64 industry and product groups.

4.1.4. Data collection and data sources

Input-output is a derived statistics for which only some data are separately collected. The most important data sources are national accounts, structural statistics on manufacturing and products, structural statistics on service industries, statistics on foreign trade, Register of Enterprises and Establishments, corporate taxation records, source data for statistics on central and local government and agriculture and forestry, and the Household Budget Survey. Various other data



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used is the calendar year. The annual data are collected in February. The inquiry covers all enterprises with at least ten employees and in certain cases smaller enterprises than this engaged in manufacturing activities. Commodity statistics are based on the Statistics Act (280/2004) and the PRODCOM Regulation (Council Regulation (EEC) No 3924/91), which defines the survey concerning industrial production in the Community. The Statistics Act obliges Statistics Finland to treat the data as confidential.

4.1.5. Time of release and time series

Supply and use tables for year t are published in December t+2. Supply and use tables have been compiled annually from 1995. Inputoutput tables have been compiled in Finland previously for 1956, 1959, 1970, 1980, 1982, 1985,1989, 1992, 1993 and 1995.

4.2. Other data sources

State Treasury and Tax Administration provide data on total tax revenues and by tax category. In this data environmental taxes are not presented according to the tax categories by the Module for environmentally related taxes by economic activity of the Regulation of European environmental economic accounts.

5. Compiling methods

5.1. Environmental taxes

The total sums of taxes are available from State Treasury and Tax Administration. The starting point for calculations of environmental taxes by economic activity is the supply and use tables of the National accounts. Most of the environmental taxes (tax on electricity and some fuels, tax on liquid fuels, fee of maintenance support performance, oil waste fee, oil pollution fee) are directly available by economic activities from supply and use tables.

Tax on waste during the years 1995-2007 is allocated to the branch 90 (sewage and refuse disposal, sanitation and similar activities) and 2008 branch 38 (waste collection, treatment and disposal activities; material recovery).

Excise tax on some beverage packing is allocated to the branches of industry with the aid of alcohol tax. Distribution of alcohol tax by economic activities is available from the supply and use tables.

Tax on pesticides is allocated to the branch 01 (agriculture, hunting and related service activities).

Distribution of car and motorcycle tax by economic activities are calculated by using distribution of transport investments from supply and use tables.

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Vehicle tax and motor-vehicle tax are allocated to the branches using calculation of National Accounts. Since 2004 distribution of vehicle tax is calculated by using distribution of vehicle tax in 1995-2003. As this distribution is not necessarily accurate the possibility to use more exact data was considered during the project. Finnish Transport Safety Agency (TraFi) has maintained a register regarding vehicle tax since 2004. By using identity codes of vehicle owners and users this information can be divided into branches of industry.

Editing of the data of the TraFi is in progress. The large size of the data file and problems in dividing the data into the right statistical year have delayed the editing process. The TraFi data will be in full use in 2013, when environmental taxes by economic activity 2009-2011 will be calculated.

5.2. Items of the bridging table

Besides the distribution of environmental tax revenue by tax category (energy, transport, pollution, resources), environmental tax revenues can be allocated to the different actors which pay them. The breakdown of statistics on environmental taxes follows the residential principle of the national accounts, allowing for a distinction between the taxes paid by residents and non-residents. However, in practice it is difficult to differentiate properly between taxes paid by residents and those paid by non-residents. Malta is the only country capable of identifying environmental taxes on the basis of the residence principle. (Source: Environmental statistics and accounts in Europe, Eurostat Statistical books. Page 329)

A distinction between residents and not-residents paying environmental taxes is not directly available from supply-use tables of Statistics Finland. Some physical information on fuels related to this distinction can be derived from Finnish NAMEA air -calculations, but at present it is not sufficient to be used in formulation of the full bridging table for environmental taxes by economic activities in Finland. Bridging table is not as essential element for environmental taxes than it is for air emissions by economic activity.

6. Analysing interactions between environmental taxes and economic development of Finland

6.1. General comments

Environmental taxes by economic activity are fully consistent with statistics provided by the National accounts. Information on environmental taxes is directly comparable with other monetary information compiled and presented in the framework of National accounting.

The most part of environmental taxes in Finland are related to energy and transport. Air emission accounts and environmental taxes by economic activities together contain a great amount of detailed infor-

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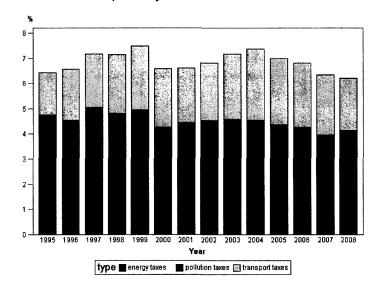
mation that can be used in analysing development of relationship between environmental taxation and emissions to air. Development of energy accounts will support and expand these analysis.

However, too straightforward conclusions on development in individual branches of industry especially in services sector should be avoided. Physical data for services sector on fuel use and emissions to air are often derived from monetary supply-use data, and this effects to correlation between physical and monetary variables in some branches of industry.

6.2. Some examples

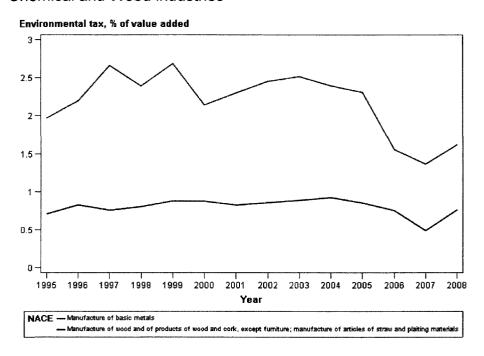
The share of environmental taxes of total tax revenues in Finland has been rather steady in 1995-2008, changing between 6,2 and 7,5 percent. The share of environmental taxes of GDP was at the highest level four percent in 1999, and decreased after that to three percent in 2008. Changes at national level are relatively small, as seem to be in quite many individual branches of industry as well. An example of this is given in picture 6.2, which describe proportion of environmental tax of value added in branches of Manufacture of basic metals (C 24) and Manufacture of wood and products of wood (C 16). On the other hand, in some branches such as e.g. Chemical industry (C 20) annual variation of this proportion is much higher.

Picture 6.1. Proportion of environmental taxes of total tax revenues and compulsory social contributions 1995-2008



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Picture 6.2. Proportion of environmental taxes of value added of Chemical and Wood industries



The influence of environmental taxes to the economy of individual branches of industry can also be described and analysed with respect to production and intermediate consumption of these branches of industry.

7. Conclusions and suggestions for improvements

The methodology for regular production of statistics on environmental taxes by economic activities is created and it is ready for regular production of annual statistics according to the regulation on environmental accounts. Based on experiences gained in this project it is estimated, that reporting of 2009 - 2011 data to Eurostat and publication at Statistics Finland in 2013 will require a resource of three labour months.

The project of the environmental taxes by economic activities was expected to produce time series 1995 - 2008 by NACE Rev. 1 A*64 and the year 2008 by Rev. 2 A*64. The data is not available for the calculation of the year 2008 by NACE Rev. 1 A*64. Year 2008 is reported only by Rev. 2 A*64. However, at the level of aggregation used in table 3.3. (page 8) the results can be well treated as a full time series 1995-2008, especially if the branch Water supply, sewerage, waste management etc. (E36-E39) is shown separately.

Some problems occurred in compilation of time series, because of changes in definition of tax base concerning environmental taxes that took place during 1995-2008. Disaggregation of basic data on environmental taxes at such detailed level than NACE A*64 in service

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sector was also to some extent problematic. The conclusion of the project still is, that quality and reliability of time series at NACE A*64 level are adequate for the use in Eurostat and publication in Finland.

In the beginning of the project it was unclear, how tax returns should be taken into account in calculations. An approach similar to that used in National accounts was chosen, and only actually paid taxes were accounted ('net-approach'). If amount of tax returns increase remarkably in the future, it may become necessary to consider separate recording of these returns in order to see how they may effect to behaviour of tax payers. However, the leading principle should be that monetary environmental accounts follow the same practises than National accounts.

In the future the data regarding vehicle tax since 2004 will be sourced from Finnish Transport Safety Agency (TraFi). Within this revision the methodology for regular production of statistics on environmental taxes by economic activities will be developed regarding vehicle tax. Editing of this data is in progress. Improved method for calculation of vehicle tax by economic activities might be a benefit to National Accounts also.

If it will be possible with respect to resources of environmental accounting, a detailed comparison of results obtained by the TraFi data and National Accounts supply-use tables on years 2004 - 2008 will be made. This comparison will show, whether it is necessary to replace the present time series on transport taxes with the series based entirely on the TraFi data.

The sum of electricity tax is divided to branch of industries in the supply-use tables. In the end of the project it was noticed that electricity tax on some branches of industries is not exactly correct. Tax concession of some branches of manufacturing industry are not taken account in supply-use tables. National accounts will investigate this while compiling the supply-use tables for the year 2010. If the supply-use tables will be corrected retrospectively the same correction will be made to the time series of environmental taxes also.