Statistics in focus

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Economic activities and their pressure on the environment 1995-2001

In 2000 on average across the EU, the Electricity, gas and water supply industry (NACE E) had, at 38%, the largest share of total carbon dioxide (CO_2) emissions. Together with Manufacturing industry (NACE D) these economic activities accounted for two thirds of total CO_2 emissions. Environmental pressure in relation to the economy is considerably higher for NACE E than for all other industries: 6776 tonnes of CO_2 emissions per million euro Gross Value Added (GVA) in comparison with 544 tonnes of CO_2 emissions per million euro GVA for NACE D. The GVA is the contribution of each industry to the Gross Domestic Product (GDP).

The National Accounting Matrix including Environmental Accounts (NAMEA) is a conceptual tool that links conventional national accounts and environmental accounts. This means that NAMEA jointly presents environmental and economic data broken down by industry and household categories. The main goal of the current publication is to present as an example the analysis of CO_2 emissions from the NAMEA for the time period 1995-2001. The year 2000 has been selected for a detailed analysis by industry because the data coverage was better than for 2001.

Figure 1: Ratio of CO_2 emissions and GVA by Member States (MS) and by industry in 2000, in thousand tonnes per million euro

NAMEA helps to identify the sources of air pollution. Moreover, the satellite account provides the opportunity to benchmark between countries and industries (see Figure 1). If the ratio "CO_2 emissions per million euro" for a particular industry in one Member State (MS) is significantly higher than the EU-15 average, the reasons for the differences need to be investigated. Additionally, the following questions arise: Who is the best? Who sets the standard? The process continues with learning from these first premises. For example, 'CO_2 emissions per million euro' from Electricity, gas and water supply (NACE E) in Greece and Sweden differ considerably. What is the reason for this difference? Are there possibilities for technology transfers[1]? Is it because of heterogeneous industry classifications or is it rather, due to structural differences in these two countries? These issues are considered below. Please note that the CO_2 emissions in 2000 for Greece, France, Luxembourg and Portugal are estimated in this publication.

1 Kyoto Protocol, Article 3: "Any certified emission reductions which a Party acquires from another Party in accordance with the provisions of Article 12 shall be added to the assigned amount for the acquiring Party." See also "Joint Implementation" and "Clean Development Mechanism" under the Kyoto Protocol.

The environmental satellite account

The 6th Environment Action Programme identifies climate change caused by emissions of greenhouse gases as a key policy area to be addressed. The European Climate Change Programme calls for the integration of climate change objectives into sectoral policies and the Task Force for Sustainable Development Indicators calls for the full implementation of the European Strategy for Environmental Accounts. NAMEA extends national accounts with a system of environmental accounts and indicators for different economic sectors and can be regarded as a satellite account. This system allows an analysis of the performance of an industry where the emissions are normalised by the size of the economy. As far as economic data are concerned traditional economic indicators are used with the addition of related environmental economic data such as environmental taxes and environmental protection expenditure. Environmentally related data has so far been focused on a variety of environmental pressures such as greenhouse gas emissions, emissions of acidifying substances, water pollution and waste generation.

The central framework - the national accounts - presents the development of an economy over time. It shows not only economic activities but also the levels of an economy's productive assets and the wealth of its inhabitants at particular points in time. It includes an external account that displays the links between an economy and the rest of the world. If environmental aspects were directly included in national accounts they would be overburdened with detailed information. A satellite approach is therefore applied, where some conceptual freedoms exist for compiling the accounts and for the reporting obligations. The satellite account, in this case the environmental accounts, can therefore be linked directly mainly at the two-digit NACE level. In the national accounts the size of the economy can be measured by the Gross Domestic Product (GDP), or as the sum of each industry's contribution to the GDP in the form of Gross Value Added (GVA).

The breakdown of emission data by industry introduces the possibility of a higher degree of in-depth analysis than data on the level of national totals but it also highlights the issue of comparability between MS and their respective industry structures. The statistical tool of NACE classification is meant to deliver a comparable set of data to the user. This tool is excellent when one business is involved in one type of activity but as soon as a business is involved in several activities it becomes harder to classify them (principal, secondary and ancillary activities, see Methodological Notes for further discussions.

This Statistics in Focus starts with the classical tool, the decoupling of emissions to GDP. Then the emissions from the different industries are analysed. Finally the emissions by NACE sectors and sub-sectors are normalised by the size of the respective economies of the Member States (MS).

Decoupling environmental pressure from economic growth

The classical description of the economy and the related environmental pressure is made by comparing GDP with emissions or by a decoupling factor. According to the OECD definition decoupling occurs if the growth of an environmental pressure is less than the growth of a given economic driving force over a certain period of time (see Methodological Notes).

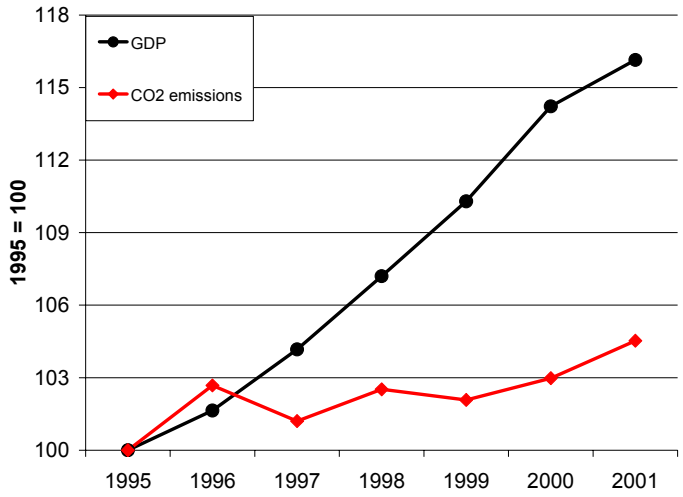

Figure 2: GDP and CO_2 emissions for EU-15 in 1995-2001, Index 1995=100

The first aspect, decoupling, is shown in Figure 2 by plotting overall economic growth in the EU-15 and the related CO_2 emissions. The economy has increased considerably between 1995 and 2001, but although CO_2 (based on NAMEA reporting) also increased it was at a slower pace than economic growth, leaving a relative decoupling. This information could also be seen from the CO_2 emissions inventory reported to the United Nations Framework Convention on Climate Change (UNFCCC).

The situation in the individual MS is described by a decoupling factor for the time period 1995-2001 in Figure 3. High values of the decoupling factor show an improvement in the decoupling ratio over time. The most distinct decoupling of CO_2 versus GDP between the years 1995 and 2001 occurs in Luxembourg and Sweden. The lowest degree of decoupling occurred in Portugal and Spain. A negative decoupling indicator, e.g. for Greece, indicates a change for the worse: a larger increase in CO_2 emissions than in gross domestic product. It also implies that the low ratio of emissions related to economic growth in some MS would mean that these MS are failing in their attempts to break the dependency. The low ratio could however also be interpreted differently. That is, if an MS had already been successful in reducing CO_2 emissions and it is now coming to a point where further reductions are difficult and the change is minimal. It is therefore important to select the suitable time period for an appropriate analysis.

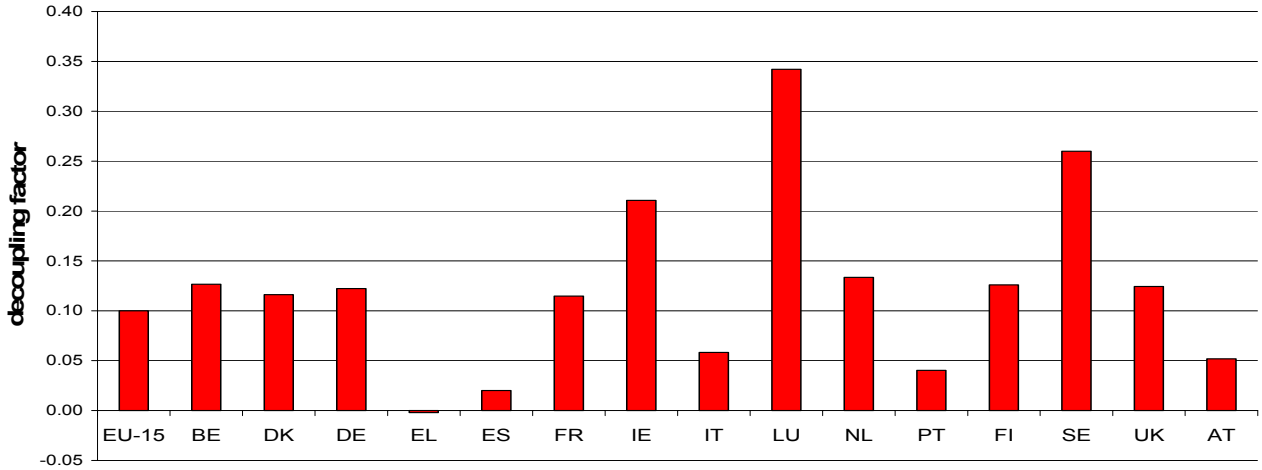

Figure 3: Decoupling factor of CO_2 emissions and GDP by MS in 1995 to 2001

Carbon dioxide emissions by industry

The previous section described the classical approach of economic activities and related air emissions. As seen in Figure 2 the results from UNFCCC inventories and NAMEA reports at an EU level give approximately the same results. The NAMEA allows a more detailed analysis of air emissions broken down by industry. There are two analytical approaches presented below that are complementary and give the reader an opportunity to become aware of country specific features in the respective economies. First, the analysis of emissions by industry is discussed and secondly emissions are normalized by the size of the economy to compare the performance between the industries in the different MS.

In 2000, 77% of carbon dioxide emissions were caused by economic activities. Households accounted for 23% of CO_2 emissions; such emissions are mainly caused by heating and transport activities. Further analysis will exclude households and focus on industry level.

Air pollution is concentrated on specific economic activities. In 2000, four sectors produced more than 90% of the total CO_2 emissions in the EU-15. The two dominant activities for such emissions on average in the EU are Electricity, gas and water supply (NACE E) and Manufacturing (NACE D) which accounted for two thirds of the total CO_2 emissions (38% and 31% respectively). On average in the EU, Transport, storage and communication (NACE I) and General services excluding transport (NACE G-Q excluding I) were minor sources (about 13% and 10% respectively). These four sources are shown in Figure 4. In the lower of the two figures, three other sources are presented and for a better comparison NACE G-Q (excluding I) is again shown because the scale is reduced for comparison. On average in the EU, Agriculture, hunting, forestry, and fishing (NACE AB), Mining and quarrying (NACE C) and Construction (NACE F) account together for less than 8% of the total CO_2 emissions.

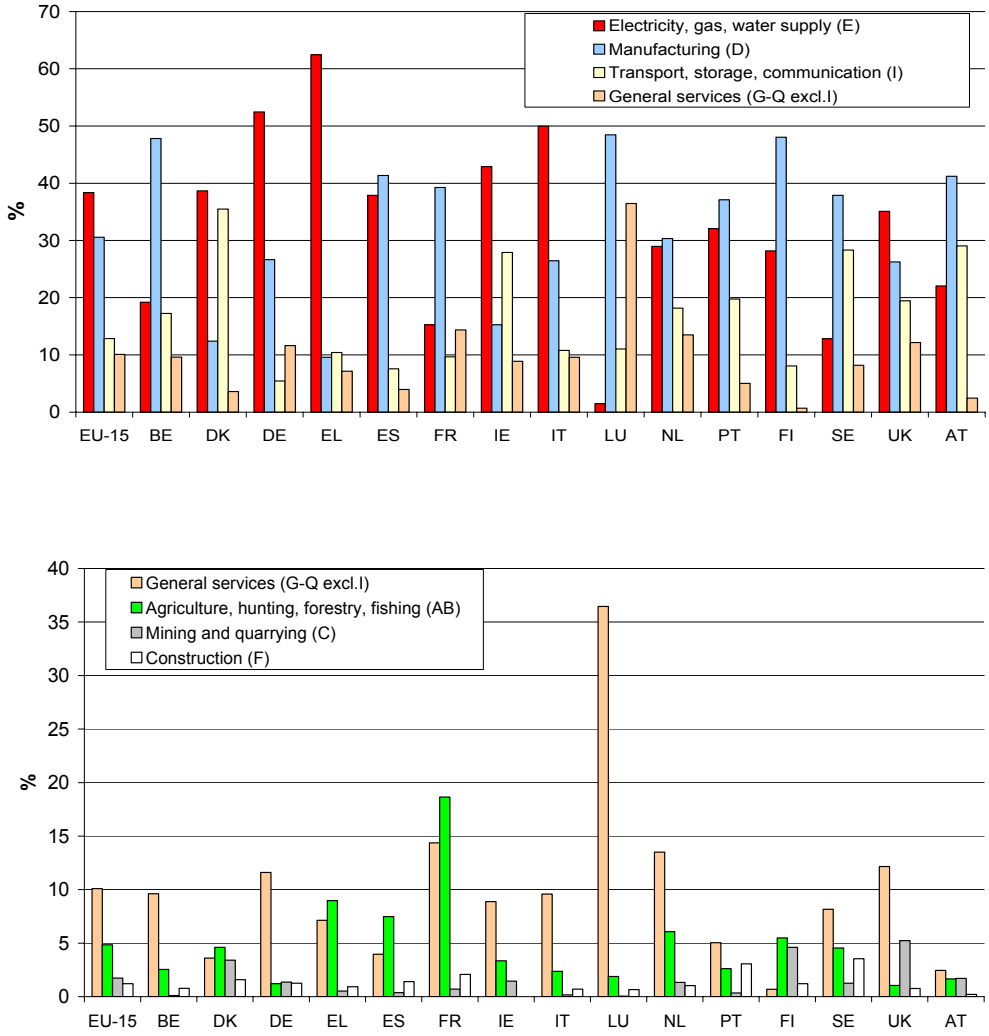

Figure 4: Share of CO_2 emissions by MS and by industry in 2000

Note: For comparison General Services (NACE G-Q excl I) are included in both figures and the scale differs.

In **Electricity, gas and water industries (NACE E)** the CO_2 emissions profile of some MS differs greatly from the EU average of 38%. There are in particular four MS that have a considerably higher share: Greece, Germany, Italy, and Ireland. To discuss the question of the representativity of the 2000 data for the MS, Figure 5a shows the time development of CO_2 emissions from 1995 to 2001 in these countries. In Germany, emissions decreased until 1999 and then they began to increase. In Italy development has been stable whereas in Greece and Ireland CO_2 emissions have increased by more than 20% between 1995 and 2000.

In four MS, Belgium, France, Sweden, and Luxembourg, the share of emissions from NACE E was below 20%. A high rate of renewable energy sources, nuclear energy or imported energy can explain the low emissions from NACE E. In France, Sweden and Belgium the share of nuclear energy is high (41%, 31%, and 22%, respectively) and in Sweden the share of renewable energy is high (32%). Austria had also a high share of renewable energy (23% of the total gross inland energy consumption), therefore the share of CO_2 emissions from NACE E is small but slightly above the 20% selection criteria (22% of the total CO_2 emissions).

Manufacturing industry (NACE D) was, on EU average in 2000, the second most important source of CO_2 emissions in the EU (Figure 4). Those MS with low emissions in NACE E, Belgium, France, Sweden, and Luxembourg, had higher shares from Manufacturing industry (NACE D). Therefore, time series of CO_2 emissions for NACE D are shown in Figure 5b for these countries. Between 1995 and 2000 Luxembourg and Sweden decreased emissions from CO_2, Luxembourg by over 30%. This sharp decline from 1996 to 1998 is due to one company that changed their energy source from coal to electricity. In 2000, four MS were above the EU average, in addition to the four countries discussed above - Finland, Spain, Austria and Portugal. Manufacturing industry can be further broken down as presented in Figure 6.

Transport, storage and communication sector (NACE I) was the third most important emitter on average in the EU in 2000 as seen in Figure 4. Eight MS are well above the EU-15 average of 13%. Looking at the sub-sectors of transport activities around half of the CO_2 emissions are related to land transport on EU average, air and water transport are on the second and the third place with nearly the same importance. No detailed information is available for Luxembourg and Ireland.

General services (NACE G-Q excluding I) had a low share of CO_2 emissions on average in the EU. In Luxembourg however the 36% of CO_2 emissions in these sectors are connected to Waste and waste water treatment (part of NACE O) and to Financial intermediation (part of NACE J). This very high share reflects the lack of emissions from heavy industry and electricity production.

Agriculture, hunting and fishery (NACE AB) account for 5% of total CO_2 emissions at EU level as seen in Figure 4, the lower figure. For some MS the share is however much higher, for example France, Greece, and in the Netherlands.

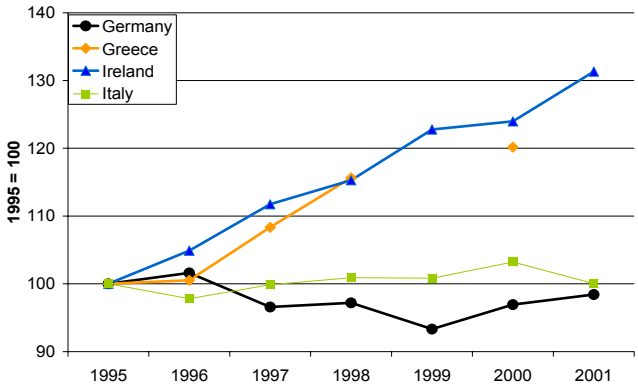

Figure 5a: CO_2 emissions in Electricity, gas and water supply for selected MS in 1995-2001
Note: 1999 and 2001 missing for Greece, 2000 was estimated by Eurostat.

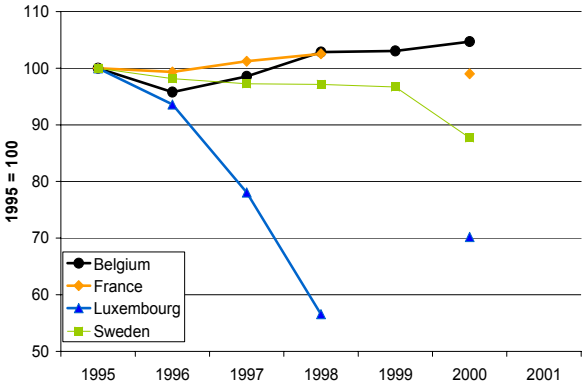

Figure 5b: CO_2 emissions in manufacturing industry for selected MS in 1995-2000
Note: 1999 missing for Luxembourg and France, 2000 was estimated by Eurostat.

The highest share of CO_2 emissions within NACE D on average in the EU comes from the manufacturing of basic metals and fabricated metal products (NACE DJ) and the manufacturing of other non-metallic mineral products (NACE DI) see Figure 6. The first, NACE DJ, contains "Manufacture of basic iron and steel and ferro-alloys" and the second, NACE DI, includes "Manufacture of cement, lime and plaster".

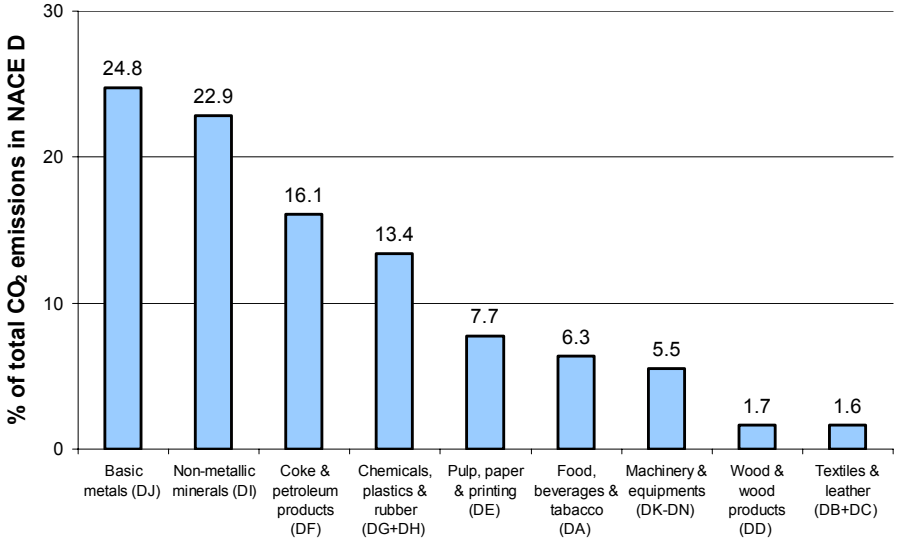

Figure 6: CO_2 emissions in EU-15, detailed share of manufacturing industries in 2000

Emissions in relationship to economic performance

The size of an industry can be measured by the gross value added, which is each sector's contribution to GDP. In the further analysis of emissions this is taken into account. Table 1 presents the ratio of emissions and gross value added for the different industrial sectors for the EU-15 in 2000. As already mentioned, one of the main features of the NAMEA is the direct link to the national accounts. UNFCCC data can be used for data validation and gap-filling but cannot provide the proper sectoral approach in connection with standard economic data.

As seen from Table 1, on average, 350 tonnes of CO_2 were emitted per million euro of GVA generated in 2000 in the EU-15 economy. This should not be confused with the measure of costs per tonne of CO_2 emissions. According to the cross-industry analysis in Figure 4, Electricity, gas and water supply (NACE E), had the highest share of CO_2 emissions. Looking back at the volume based analysis the results here are comparable for NACE E. In Table 1 it can be seen that the industry is well above the total industries average with 6776 tonnes of CO_2 emitted per million euro. Coal and lignite are particularly high in carbon, compared to their energy content. Natural gas has approximately 40% less carbon per unit of energy than coal and 25% less than oil. Fossil fuels are the most important source of CO_2 emissions and the activity's relative contribution to the economy is not counterweight to the ratio as for other industries. In 2000 the Electricity, gas and water supply industry had a gross value added of 155 billion euro in EU-15, which is about 2% of total GVA for all industries.

Manufacturing industry (NACE D) contributes 544 tonnes of CO_2 emissions per million euro GVA. The economic benefit measured in GVA for manufacturing industry is high. Although the volume based analysis in Figure 4 showed on EU average manufacturing industry as the second largest emitter of CO_2 the normalised environmental pressure ranks this industry in fifth place on sector level. In 2000 in EU-15 its share of total GVA for all NACE was 20% or 1 543 billion euro. As the diversity of activities included in manufacturing industry by the NACE classification complicates a straightforward analysis, so the sub-sections are also included in Table 1. When considering different subsections of NACE D there are two sub-sections which stand out compared to the others. Manufacture of coke, refined petroleum products, nuclear fuel (NACE DF) and Manufacture of other non-metallic mineral products (NACE DI) contribute a relatively large amount to CO_2 emissions per million euro GVA.

Manufacture of basic metals and fabricated metal products (NACE DJ) which from the volume point of view had the highest share of CO_2 emissions within the manufacturing industry as seen in Figure 6, contribute less to CO_2 emissions per million euro GVA at EU-15 level in 2000 from the economic point of view. This sector contributed about 13% of total manufacturing's GVA or 196 billion euro.

Industries		
E	**Electricity, gas & water supply**	**6776**
DF	*Coke, refined petroleum products, nuclear fuel*	*4335*
DI	*Non-metallic minerals*	*2753*
DJ	*Basic metals, metal products*	*1062*
AB	**Agriculture, hunting, forestry & fishing**	**790**
C	**Mining & quarrying**	**638**
I	**Transport**	**636**
D	**Manufacturing**	**544**
DG + DH	*Chemicals, plastics & rubber*	*511*
DE	*Pulp, paper & printing*	*437*
DD	*Wood & wood products*	*403*
DA	*Food, beverages & tobacco*	*299*
DB + DC	*Textiles & leather*	*162*
DK + DL + DM + DN	*Machinery & equipments*	*80*
F	**Construction**	**77**
G - Q (excl. I)	**General services (excl. Transport)**	**56**
Total industries		**350**

Table 1: Ratio of CO_2 emissions and GVA for EU-15 in 2000, by industry, in tonnes per million euro. Ranked by decreasing order

Cross country comparison

As mentioned in the first chapter, the NAMEA enables not just the identification of the sources of pollution but also benchmarking opportunities between countries and industries (see Figure 1). It was seen that Greece emitted 30 thousand tonnes of CO_2 per million Euro GVA in the Electricity, gas and water supply industry. This ratio is higher than for any other MS. Please note that these values are estimated based on UNFCCC inventories due to a non-response from Greece to Eurostat's questionnaire. If this result is not due to the estimation procedure then it could be due to the classification of secondary or ancillary activities according to NACE nomenclature. The third possibility is that the technology can be improved in line with the Joint Implementation of the Kyoto Protocol.

On average in the EU there is very little difference between the ratio "emissions per GVA" for other NACE sectors (Figure 1). A cross-country comparison shows a deviation in Finland in the Mining and quarrying (NACE C) industry where 63% of all businesses involved extract coal and lignite. The sector overall contributes only to 0.3% of EU-15 GVA in the Mining and quarrying industry (NACE C). Germany and Austria are also above the EU average but GVA was higher than in Finland. In the Transport, storage and communication (NACE I) sector three countries are clearly above the EU average: Denmark, Ireland, and Portugal. In the

Agriculture, hunting, forestry and fishing (NACE AB), France deviates from the EU average as seen previously in figure 4.

For Manufacturing industry (NACE D), six countries are above the EU average. The ratio for all these six countries is close to 1 thousand tonnes of CO_2 emissions per million euro. However manufacturing industry is, as already mentioned above, very diverse and consists of many different activities. Overall manufacturing industry is comparatively efficient in the context of CO_2 intensities, but looking at the sub-sectors of NACE D, on average in the EU in Table 1 three groups have high ratios: manufacture of coke, refined petroleum products, nuclear fuel (DF), manufacture of other non-metallic mineral products (DI), and manufacture of basic metals and fabricated metal products (DJ). The CO_2 intensity for Chemicals, plastics & rubber (NACE DG+DH) is much smaller.

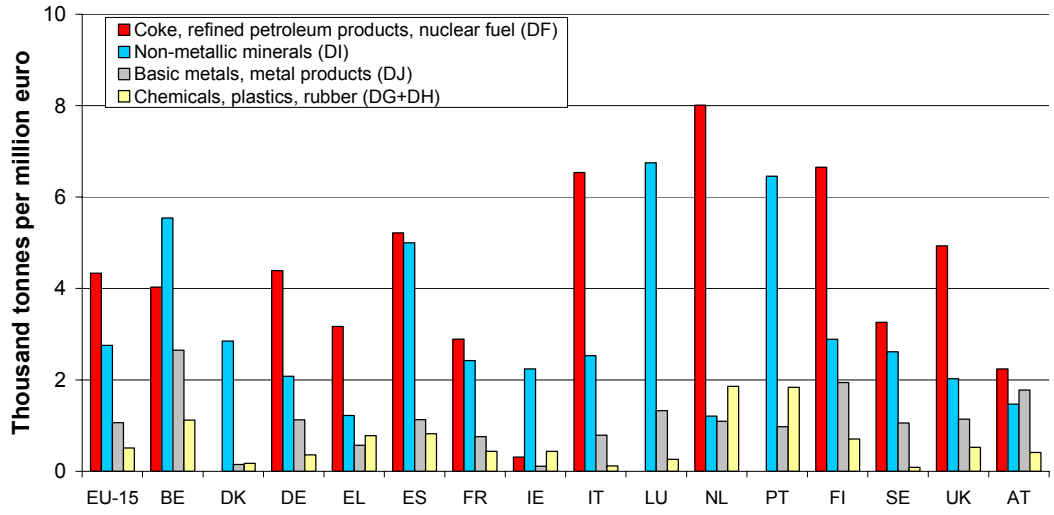

Figure 7: Ratio of CO_2 emissions and GVA by MS and by industry in 2000
Note: Refineries (NACE DF) in Denmark and Portugal are excluded due to confidentiality.

Figure 7 presents the ratio of CO_2 emissions by GVA for different NACE D sub-sectors. With **Manufacture of coke, refined petroleum products, nuclear fuel (NACE DF)** it is difficult to compare between countries. Size, complexity and the different types of crude oil that is produced cause emissions to vary distinctly. Five countries are above the EU-15 average of 4 thousand tonnes per million euro. Between 1995 and 2000 the economic performance (GVA for NACE DF) increased for four of the five countries (Finland, Netherlands, Spain, and United Kingdom); the GVA in Italy decreased during the same time period. To draw any conclusions one has to consider several aspects. It could be argued for these MS that they are performing poorly compared with their neighbours. It could also be argued that the sector in these specific MS have not the same economic structure. A third argument is related to the issue of classifying a business according to their main, secondary and ancillary activities. In some cases the ancillary activities can be almost as important as the main activities.

Manufacture of other non-metallic minerals (NACE DI) is heavy industry with high CO_2 emissions per million euro GVA. The emissions of carbon dioxide in these industries are not only related to heavy use of energy but also to chemical reactions in the production process. As mentioned NACE DI includes businesses that are active in the production of glass, ceramic goods, bricks and cement. Four countries are above the EU average, Luxembourg, Portugal, Belgium, and Spain. The GVA have since 1990 to 2000 increased for Portugal Belgium and Luxembourg. In Spain the GVA increased from 1995 to 2000 (no data available before 1995).

Manufacture of basic metals and fabricated metal products (NACE DJ) consists among other things of production of basic iron, steel, precious metals, production of aluminium, zinc, and copper. Three countries are above the EU average; Belgium, Finland and Austria. All three countries have increased their contribution to GDP between 1990 and 2000.

Manufacturing of chemicals, plastics and rubber products (NACE DG+DH) contributes 511 tonnes of CO_2 per million euro GVA on EU average. Seven countries are above the average in a range of 1 860 to 520 tonnes of CO_2 per million euro GVA. Overall it can be seen in Figure 7 that there are very few significant differences between the MS.

Conclusions

The major advantage of the NAMEA is the possibility to interlink data on air emissions with macroeconomic or even social data. That means a coherent set of environmental, social and economic indicators can be derived with a high degree of international comparability of the results and all indicators are closely linked to one another. This is a key basis for integrated economic and environmental analysis and modelling, including cost-effectiveness analyses, scenario modelling and economic and environmental forecasts. This integrated framework allows sectoral policies and indicators to be part in a comprehensive economic, social, and environmental context. The main goal of this publication was to consider as an example the CO_2 emissions by industries.

NAMEA can provide answers to the questions: Who is causing the strongest pressure on the environment? Who is doing better? Beside the classical technique of decoupling, two new approaches to CO_2 emissions were presented. The first one was based on the share of total CO_2 emissions by industry and the second approach normalises such emissions by the economic size of the related industry. On EU average, Electricity, gas and water supply (NACE E) had in 2000 the highest share of total CO_2 emissions (38%) and also the highest ratio of CO_2 emissions normalized by the related gross value added (GVA, 6 776 tonnes of CO_2 emissions per million euro. Manufacturing industry (NACE D) produced 31% of the total CO_2 emissions but the ratio of environmental pressure and economic size is much smaller than for NACE E (544 tonnes of CO_2 emissions per million euro). The normalized emission from Electricity, gas and water supply (NACE E) in MS differ considerably but further discussions with the MS are needed to distinguish between structural differences in the MS, classification problems or better (clean) technology.

In a next step, the work will extended to aggregates like total greenhouse gas emissions, acidifying substances and ozone precursors. Further analysis will include additional information such as fiscal data on environmental taxes, on environmental protection expenditure which includes investments in new technologies for the protection of the environment or data about employment and education. Moreover, the NAMEA concept described in this publication is sufficiently flexible to be used for other environmental pressures such as waste generation or water pollution (NAMEA waste and NAMEA water).

The full use of NAMEA is highly dependent on the supply of actual data by the MS. Such data is collected so far on a voluntary basis, and the response rate is quite low. Missing data had to be estimated for four MS for the production of this publication. Of the new MS, only Cyprus, Poland and Lithuania sent data for the years 2000 and 2001. From the EFTA countries Norway regularly compiles and sends data to Eurostat. But the situation will improve, as some of the new MS (Czech Republic, Hungary, Estonia and Slovenia) have decided to compile NAMEA air in the framework of the Multi Country Transition Facility projects (PHARE) and will start compiling NAMEA air on a regular basis. The higher coverage and response rates will also improve the analytical possibilities of the NAMEA.

➢ ESSENTIAL INFORMATION – METHODOLOGICAL NOTES

Gross Value Added (GVA) (ESA 1995, 9.23) is the net result of output valued at basic prices less intermediate consumption valued at purchasers' prices. GVA is calculated before consumption of fixed capital. Intermediate consumption consists of the value of the goods and services consumed as inputs by a process of production, excluding fixed assets whose consumption is recorded as consumption of fixed capital. The goods and services may be either transformed or used up by the production process (ESA 1995, 3.69). Data extraction: Gross value added at basic prices; current prices; Million euro; New Cronos 16.3. 2005

Gross domestic product (GDP) is the sum of gross value added of the various institutional sectors or the various industries plus taxes and less subsidies on products (which are not allocated to sectors and industries). Data extraction: Gross domestic product for the whole EU-15 measured at market prices, Million euro (at 1995 prices and exchange rates); New Cronos 16. 3. 2005

Measuring decoupling

Decoupling can be either absolute or relative. Absolute decoupling occurs when the relevant environmental pressure is stable or decreasing while the economic driving force is growing. Decoupling is relative when the growth rate of the environmentally relevant variable is positive, but less than the growth rate of the economic variable (Decoupling described by time series "CO_2 emissions and GDP", see Figure 2).

According to the OECD definition, decoupling can also be measured by a decoupling factor I with I=1-D. The variable D=Qb/Qa shows the change of the emission intensity Q with time (a= starting point of the selected period, b=end point). The intensity Q=P/F is defined as the ratio of environmental pressure (P, e.g. CO2 emissions) and the driving force (F, e.g. economy measured in GDP or GVA). Positive values of the decoupling factor indicate that the ratio between environmental damage and the driving force is decreasing with time. Strongly increasing emissions or a reduced economic growth leads to negative values (Decoupling factor, see Figure 3 and "Indicators to measure decoupling of environmental pressure from economic growth", OECD, 2002).

NACE sectors and sub-sectors

Nomenclature statistique des Activités économiques dans la Communauté Européenne; in English: Statistical classification of economic activities in the European Community.

Sectors

A	Agriculture, hunting and forestry
B	Fishing
C	Mining and quarrying
D	Manufacturing
E	Electricity, gas and water supply
F	Construction
G	Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods
H	Hotels and restaurants
I	Transport, storage and communication
J	Financial intermediation
K	Real estate, renting and business activities
L	Public administration and defence; compulsory social security
M	Education
N	Health and social work
O	Other community, social and personal service activities
P	Activities of households
Q	Extra-territorial organizations and bodies

Sub-sectors

DA	Manufacture of food products, beverages and tobacco
DB	Manufacture of textiles and textile products
DC	Manufacture of leather and leather products
DD	Manufacture of wood and wood products
DE	Manufacture of pulp, paper and paper products; publishing and printing
DF	Manufacture of coke, refined petroleum products and nuclear fuel
DG	Manufacture of chemicals, chemical products and man-made fibres
DH	Manufacture of rubber and plastic products
DI	Manufacture of other non-metallic mineral products
DJ	Manufacture of basic metals and fabricated metal products
DK	Manufacture of machinery and equipment n.e.c.
DL	Manufacture of electrical and optical equipment
DM	Manufacture of transport equipment
DN	Manufacturing n.e.c

When an enterprise which produces goods and services has a **principal activity** and one or more secondary activities it should be subdivided into the same number of Kind-of-Activity Units and secondary activities (ESA1995, 3.10). These should be classified under different NACE headings from the principal activities (ESA 1995, 2.107). This means that if one business is, for example, involved with both distributing drinking water and receiving municipal waste water for treatment this would classify it in both NACE 41 (collection, purification and distribution of water) and NACE 90 (Sewage and refuse disposal, and similar activities).

Secondary activity, this is an external activity. The output of an **ancillary activity** is defined as not intended to be used outside the enterprise and should not be recorded in a different NACE heading to the main activity. For instance: purchasing, marketing, accounting cleaning or security services. One example: some energy supplies in Sweden come from the pulp and paper industry. Due to the

heavy use of energy in this industry several businesses have their own power plants. This also applies to the Finnish pulp and paper industry. Some of the energy that is not used by the plant itself is often sold to the local community. As the principal activities of these businesses are the production of pulp and paper, the activities related to energy production are often not distinguished in the data and therefore influence the results. The importance of correctly classifying businesses becomes apparent when physical data such as air emissions are linked to national accounts and multi-country comparisons are being made. Ancillary activities such as waste water treatment, waste incineration or electricity production in, for example, the chemical industry and the pulp and paper industry can have high emissions and thus influence the emissions profile amongst others and impact on the environmental economic analysis. This means that there is no fit with the theoretical assumption that all MS despite their structure would have approximately the same emissions if their industries were homogenous and using the same production processes.

Data quality

NAMEA air emission accounts standard tables cover the following pollutants: carbon dioxide, nitrous oxide, methane, fluorinated gases (HFCs, PFCs, SF6, CFCs, HCFCs), nitrogen oxides, sulphur oxides, ammonia, Volatile Organic Compounds, carbon monoxide, particulate matters, and heavy metals (As, Hg, Pb, Zn, Cd, Cr, Se, Cu, Ni). Data are reported according to NACE two-digit level and for some industries at NACE three-digit level.

Most of the data were received on the basis of Eurostat's questionnaire containing NAMEA air standard tables which was sent to the EU 25 MS plus EFTA countries and Romania and Bulgaria in June 2004. The response rate is not very high, in general, and the last reports came back at the end of March 2005. The best data coverage is for EU-15 therefore the analysis concentrates on this data. The time period "1995-2001" was chosen for validation and decoupling because most of the 15 MS reported emission data. For the detailed analysis of air emissions broken down by industry, the year 2000 was chosen because there was higher data coverage across MS than for 2001 and 2002. Missing values have been estimated using the UNFCCC inventories. It should be noted that emissions from water transport in Greece were underestimated in 2000 because there was no appropriate information about the share of this sector in the total transport sector.

The estimation method is based on previous replies from the countries in question. From the reply a share of each industry is calculated and then applied to the data reported to the UNFCCC. The share does not take into account any structural change in the sectors as they are fully based on the latest year available. Forthcoming work will include a weighting variable to account for any changes in the industries for those countries where estimations are needed.

Concerning GVA, Ireland had no data available by industry at the time of data extraction. The data are derived from subtracting EU-14 to the EU-15 total. Included are therefore all irregular estimation influences, so the quality of the implicit country estimate does not reach that of an independent estimation.

	BE	DK	DE	EL	ES	FR	IE	IT	LU	NL	PT	FI	SE	UK	AT
1990	X	X		X		X		X		X				X	X
1991		X	X	X		X		X		X				X	X
1992		X	X	X		X		X		X				X	X
1993		X	X	X		X		X		X			X	X	X
1994	X	X	X	X		X	X	X		X			X	X	X
1995	X	X	X	X	X	X	X	X	X	X	E	E	X	X	X
1996	X	X	X	X	X	X	X	X	X	X	X	E	X	X	X
1997	X	X	X	X	X	X	X	X	X	X	X	E	X	X	X
1998	X	X	X	X	X	X	X	X	X	X	X	E	X	X	X
1999	X	X	X	E	X	E	X	X	E	X	X	E	X	X	X
2000	X	X	X	Ed	X	Ed	X	X	Ed	X	Ed	X	X	X	X
2001	X	X	X	E	E	E	X	X	E	X	E	E	E	X	X
2002		X	X				X			X				X	

Table 2: Data availability for EU-15 Member States

X= data available, E = totals are estimated; Ed = totals as well as industrial breakdown are estimated.

UNFCCC for validation and gap filling

Another data source for CO_2 emissions is used for validation and gap filling – the greenhouse gas emission inventories collected under the United Nations Framework Convention on Climate Change (UNFCCC). In general the CO2 emissions in the NAMEA standard tables differ from the emissions reported under the UNFCCC. Figure 8 shows a comparison of the CO2 emissions by MS from the NAMEA questionnaire and from UNFCCC inventories (without removals from land

use changes and forestry). As NAMEA uses national accounts principles, only emissions that can be traced to economic activities are of relevance:

Emissions from **non-economic agents** (e.g. nature, removals by land use changes and forestry) are not included in the NAMEA. But emissions from **biomass** when it is connected with economic activities (wood and wood waste, charcoal, bio-alcohol, black liquor, as well as landfill and sludge gas) are included. These emissions from biomass are excluded from national UNFCCC total, but they are reported separately for information under Memo Items.

Emissions covered must be those stemming from national economic activities i.e. **residential principle** (i.e. those generated by resident units) rather than from sources on the national territory i.e. **territorial principle**. Emissions by resident units abroad, essentially covering tourists driving abroad and companies engaged in international transport activities, should be fully included in the accounts either under the industry earning the value added from these activities or under households (transport). Conversely, all emissions by non-resident entities (foreign lorries and tourists) within the national boundary should be excluded.

Although NAMEA and UNFCCC give comparable national totals (Figure 2 and 8) their nomenclature differs considerably. NAMEA, the satellite account, is broken down by NACE sectors and sub-sectors whereas UNFCCC is reported in a process oriented nomenclature. The classification of the GHG emissions inventory reported in CRF (Common Reporting Format) to the secretary of UNFCCC does not coincide with the NACE nomenclature. For further information see the NAMEA compilation guide[2]. In the 2000 UNFCCC inventory fuel combustion accounted for 95% of total CO_2 emissions and nearly all other emissions came from industrial processes. In the UNFCCC inventories GHG emissions, fuel combustion for heat and transportation in agriculture is part of the energy sector; in NAMEA such emissions contribute to NACE AB. Key sources for CO_2 emissions from Industrial Processes are Cement, Lime, Iron and Steel, and ammonia production[3].

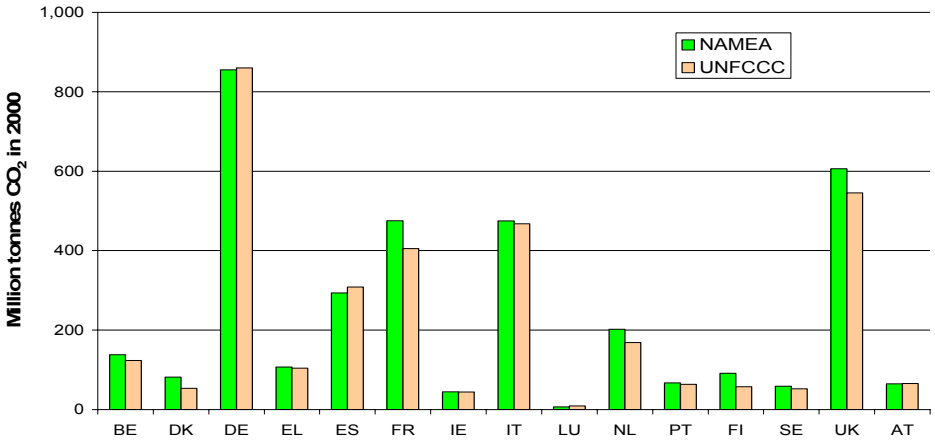

Figure 8: Total CO_2 emissions in 2000 reported under NAMEA and under UNFCCC in million tonnes

Note: Includes households and industries, UNFCC excludes land use changes and forestry. EU-15 NAMEA 3,566 million tonnes of CO_2 emissions; EU-15 UNFCCC 3,328 million tonnes of CO_2 emissions.

Acronym list

CO_2	Carbon Dioxide
EU-15	European Union, including the 15 Member States: Belgium (BE), Denmark (DK), Germany (DE), Greece (EL), Spain (ES), France (FR), Ireland (IE), Italy (IT), Luxembourg (LU), the Netherlands (NL), Austria (AT), Portugal (PT), Finland (FI), Sweden (SE) and the United Kingdom (UK).
GDP	Gross Domestic Product
GVA	Gross Value Added
MS	Member States
NACE	Nomenclature statistique des Activités économiques dans la Communauté Européenne
NAMEA	National Accounting Matrix including Environmental Accounts
OECD	Organization for Economic Co-operation and Development
UNFCCC	United Nations Framework Convention on Climate Change

2 NAMEA for Air Emissions, Compilation guide unpublished.

http://forum.europa.eu.int/Public/irc/dsis/envirmeet/library?l=/meetings_2003_archive/2003062627snameasairsemi&vm=detailed&sb=Title

3 Annual European Community greenhouse gas inventory 1990-2003 and inventory report 2005. Submission to the UNFCCC Secretariat, European Environment Agency, Technical Report No 4/2005.

Further information:

Databases

EUROSTAT Website/Economy and finance/National accounts/Annual national accounts/Breakdowns/Breakdown by 31 branches - Macroeconomic aggregates at current prices

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