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Report for Eurostat

Summary Report : The Belgian Environmental Tax Accounts, Environmental Protection Expenditure Accounts, and Air Emissions Accounts

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Abstract – This report provides a summary of the results obtained for three environmental accounts for Belgium, namely the Environmental Tax Accounts, the Environmental Protection Expenditure Accounts, and the Air Emissions Accounts.

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The current Belgian environmental accounts project, co-financed by Eurostat by means of grant agreement 50304.2008.001-2008.325, consists of the update of three environmental accounts, the environmental tax accounts, the environmental protection expenditure accounts and the air emissions accounts. The latter have also been used to draw environmental-economic profiles of the Belgian industries, to analyse their emission-intensity, to allocate air polluting emissions to final demand by product, and to evaluate environmental leakage for Belgium.

1. Environmental tax accounts

The environmental tax accounts contain all taxes of which the tax base is a physical unit of something that has a negative impact on the environment. The environmental tax accounts for Belgium were extended with data for the period 2005-2007, and the complete series were revised as to obtain a coherent dataset for the period 1997-2007.

Between 1997 and 2007 environmental taxes increased by 29 percent, from just over 6 billion euro at the start of the period to almost 7.8 billion euro in 2007. This rise is considerably smaller than the increase in total taxes collected over the same period. Total tax revenue increased by 51 percent between 1997 and 2007. As a consequence the share of environmental taxes in total tax revenue decreased from 9.1 percent in 1997 to 7.8 percent in 2007.

The composition of the environmental taxes was fairly stable. The largest part of environmental taxes was linked to energy products. This type of environmental tax accounted for just below 60 percent of the total. About one third of environmental taxes consisted of transport taxes. Pollution taxes accounted for just below 10 percent of the total. Resource taxes were negligible, and they became all the more so over the period under consideration, as revenues from this type of tax decreased by more than 42 percent between 1997 and 2007. Almost exactly the opposite evolution can be observed for pollution taxes, the tax type showing the highest increase.

Households and industries each paid about half of the environmental taxes in Belgium during the period 1997-2007. Although the distribution of total taxes was stable over this period, this was not the case for all the different types of environmental taxes. Energy taxation, the main environmental tax type, shifted slightly from industries to households. Industries nevertheless still paid a considerably larger share of energy taxes than the households. For transport taxes the shift has gone the other way.

When we consider environmental taxes paid by the industries only, on average almost a third was paid by the land transport industry during the period 1997-2007. Together with the real estate, renting and business activities industry they accounted for almost half of all environmental taxes paid by the industries. The wholesale and retail trade industry contributed just below 13 percent of the industries' total environmental taxes. The construction industry contributed around 7.5 percent, which is only slightly less than the contribution of the entire manufacturing industry. The supporting and auxiliary transport activities complete the top five con-

tributors to environmental taxes paid by industries. Together these five industries accounted for almost three quarters of total industries' environmental taxes.

2. Environmental Protection Expenditure Accounts

The Environmental Protection Expenditure Accounts aim to describe all national transactions related to environmental protection, with the purpose of constructing a measure of national environmental protection expenditure which can be related to for instance gross domestic product, in order to assess the importance of these activities as a share of total production. The Environmental Protection Expenditure Accounts show which economic sectors contribute to environmental protection expenditure, both from the producers' side, as from the users' and the financing side. The Environmental Protection Expenditure Accounts can further be used to analyse which environmental domain absorbs most resources in a country, as the accounts distinguish expenditure according to those different domains (e.g. water purification, protection from air pollution, etc.).

The Belgian Environmental Protection Expenditure Accounts were extended with data for the period 2005-2007, and the complete series were revised as to obtain a coherent dataset for the period 1997-2007.

Environmental protection output in Belgium increased steadily during the period 1997-2004. In 2005 it fell back temporarily, but by 2007 environmental protection output had nevertheless more than doubled with respect to its 1997 value. Environmental protection output in 2007 was worth almost 5.5 billion euro. Most of environmental protection output was market output, and its share even increased over the years. In 1997 market output accounted for 73% of the total. By 2007 this share had risen to 80%. The corporate sector was clearly the most important producer of environmental protection services. Its share in environmental protection output rose from below two thirds in 1997 to almost three quarters in 2007. Waste was the most important environmental domain by far in Belgium during the period 1997-2007. Its share was above 70% in almost each year. From 1997 to 2002 its share did decline from 74% to 68%, but in the following five years this trend was reversed. In 2007 waste accounted for 78% of total environmental protection output in Belgium. The second most important domain was water protection. This field gained importance during the first half of the period under investigation. Its share rose from 14% in 1997 to 23% in 2002. In the years that followed it fell back, to finally reach 12% in 2007.

Gross fixed capital formation for environmental protection reached a peak in 2001, at which time 1.6 billion euro was invested. This amount declined until 2005, after which it picked up again, to reach 1.3 billion euro in 2007. The corporations were the major investors as concerns environmental protection. Their share in total environmental protection investment increased over the years. During the period 1998-2002 their average share was equal to 60%, while during the period 2003-2007 it was equal to 66%. The largest part of environmental protection investment was destined for water protection. In most of the years during the 1997-2007 period water accounted for more than half of total environmental protection investment. Waste was the sec-

ond most important environmental domain, and it became more important towards the end of the period considered. During the last three years its share accounted for over a third of total investment.

From 1997 to 2001 national expenditure for environmental protection rose from 3 billion euro to almost 5.3 billion euro. As of 2001 national expenditure for environmental protection started to decline, and by 2005 it was worth less than 4.7 billion euro. This decline was caused by a decrease in expenditure of the government, both as a producer and as a consumer, as well as a decrease in expenditure by non-specialised producers of environmental protection services. In 2006 and 2007 national expenditure for environmental protection recovered, and by 2007 it was back at its 2001 level. The importance of national expenditure for environmental protection increased substantially during the first years of the period under investigation. It rose from 1.4% of GDP in 1997 to 2% of GDP in 2001. In the following years the share of national expenditure for environmental expenditure in GDP decreased. By 2007 it had fallen back to 1.6% of GDP.

When we consider the importance of environmental protection expenditure for households, public administrations and corporations separately, we notice that although corporations have been the main contributors to both environmental protection output and investment, the importance in total intermediate consumption and investment was clearly lower than for the public administrations. For the latter the share of environmental protection investment in total investment was 9.4% on average during the 1997-2007 period, while for the corporations this was only 1.5%. The share of environmental consumption as a share of total government consumption was 1.2% on average during that same period, while the share of environmental consumption in intermediate consumption for the corporations was only 0.5%, which is even lower than the share of environmental protection expenditure by the households in total household consumption, which reached 0.7% on average between 1997 and 2007.

Transfers between the institutional sectors imply that the structure of financing of expenditure differs from the one for expenditure itself. The corporations were net receivers of transfers throughout the 1997-2007 period. Nevertheless, more than half of national expenditure for environmental protection was financed by the corporations in any single year. The share of the government rose from 14% in 1997 to 23% in 2000, after which it declined to 16% in 2007. The local authorities were the major public contributors during the early years, but as of 2000 the regional governments became the most important contributors among the three levels of government. The share of the households in the financing of total environmental protection expenditure was somewhat larger than a quarter during most of the years.

3. Air Emissions Accounts

The Air Emissions Accounts for Belgium contain data on 15 air pollutants, namely carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFC), perfluorocarbons (PFC), sulphur hexafluoride (SF_6), chlorofluorocarbons (CFC), hydrochlorofluorocarbons (HCFC), nitrogen oxides (NO_x), sulphur oxides (SO_x), ammonia (NH_3), carbon monoxide (CO),

non-methane volatile organic compounds (NMVOC), coarse particulate matter (PM_{10}), and finally fine particulate matter ($PM_{2.5}$). The Air Emissions Accounts were extended with data on these pollutants for the period 2003-2007, and the complete series were revised as to obtain a coherent dataset covering the year 1990 and the period 1994-2007. Data on fluorinated carbon emissions only exist as of 1995, though, while for particulate matter data are available only as of the year 2000.

To facilitate the presentation of the results, composite indicators were calculated for three environmental themes, namely greenhouse gas emissions, acidifying emissions and photochemical emissions. As concerns greenhouse gas emissions, two indicators were calculated. The first one is the Kyoto greenhouse gas index (GHG), which includes CO_2, CH_4, N_2O, HFC, PFC and SF_6, and is expressed in CO_2 equivalents. The second greenhouse gas indicator is the simplified greenhouse gas index (SGHG), which includes only CO_2, CH_4, and N_2O, and is expressed in CO_2 equivalents as well. This SGHG is calculated in order to be able to assess the evolution of greenhouse gases as of 1990. As acidifying emissions are concerned, the acid rain precursors NO_x, SO_x and NH_3 are expressed in hydrogen ion (H^+) equivalents to form the acidification index (ACID). Concerning photochemical emissions, a tropospheric ozone formation potential index (TOFP) is calculated, combining all tropospheric ozone precursors, namely NMVOC, CO, CH_4 and NO_x, expressed in NMVOC equivalents.

3.1 Results

The SGHG shows that Belgian greenhouse gas emissions declined by 5% between 1990 and 2007. The GHG shows that emissions of greenhouse gases inclusive of fluorinated gases decreased by 11% between 1995 and 2007. The prime greenhouse gas is of course CO_2. Carbon dioxide emissions decreased at a somewhat slower pace than the GHG. Between 1995 and 2007 they fell by only 6%. Consequently, the share of CO_2 in the GHG increased from 83% in 1995 to 88% in 2007.

When considering the shares of the economic agents in greenhouse gas emissions, we notice that the share of the industries has decreased slightly between 1990 and 2007 for the SGHG, and between 1995 and 2007 as far as the GHG is concerned. This implies that greenhouse gas emissions by the households have decreased at a slower rate than greenhouse gas emissions by the industries. However, these differences were quite small. Total industries created around 80% of all greenhouse gas emissions during the whole period for both indicators.

The electricity, gas, steam and hot water industry contributed most to total industries greenhouse gas emissions in each and every year under consideration, both for the GHG and the SGHG. Its average share over the respective periods was equal to around $1/5^{th}$ of total industries' emissions. Its emissions declined at a slower pace than total industries' emissions. The basic metals industry, the chemical industry and agriculture, hunting and related service activities all three had a comparable average share of between 11% and 13%. Their emissions de-

clined at a faster pace than total industries' emissions, at least for the GHG. The decrease for the basic metals industry was largest, with a decline of over 30% between 1995 and 2007.

Greenhouse gas emissions by the Belgian households mostly derived from heating activities. Heating had an average share of 64% of total GHG emissions by households during the 1995-2007 period, but its share decreased as emissions from heating dropped by 10%, while emissions of both transport and other activities increased by 5% and 10% respectively over the same period.

The acidifying air emissions declined sharply. Between 1990 and 2007 the ACID decreased by almost 50%. The three component gases of the ACID decreased accordingly, NO_x by 34%, NH_3 by 42% and SO_x by 66%. As a consequence, the share of NO_x in ACID increased from 35% in 1990 to 45% in 2007. Ammonia's share went up from 24% to 28%, while the share of SO_x decreased from 41% in 1990 to 27% in 2007.

The acidifying emissions by total industries decreased somewhat faster than total emissions. As a consequence, their share in total emissions decreased from 89% in 1990 to 87% in 2007. Agriculture was the main contributing industry, with a share of around one third of total industries' emissions, which increased slightly between 1990 and 2007. The share of the second largest contributor on average, the electricity, gas, heat and hot water industry, diminished substantially, from 17% in 1990 to 9% in 2007, thanks to a decrease in its acidifying emissions of no less than 75%. Land transport and the basic metals industry were on average the third and fourth largest contributors with a share of 9% and 7% respectively. Their emissions decreased at a slower pace than total industries' emissions.

Household acidifying emissions formed only a minor part of total acidifying emissions in Belgium. They fell by 39% between 1990 and 2007, and derived primarily from transport activities. Acidifying emissions from transport activities declined at a faster rate than total household emissions, however. As a consequence, its share in total acidifying household emissions dropped from 62% in 1990 to 55% in 2007.

The TOFP showed a decrease in tropospheric ozone precursor emissions in Belgium of 44% between 1990 and 2007. NO_x emissions contributed most to this indicator, and the share of this pollutant increased from 53% to 62% during that period. This increase came at the expense of NMVOC emissions, the share of which declined from 32% in 1990 to 24% in 2007. The share of carbon monoxide in the TOFP decreased moderately, falling from 15% in 1990 to 13% in 2007. Methane emissions decreased by only 34%, but still contributed no more than 1% to TOFP.

Emissions by total industries accounted for just below three quarters of total tropospheric ozone precursor emissions throughout the 1990-2007 period. The largest contributor to total industries' emissions was the land transport industry, which accounted on average for 17% of the total. Its share decreased over time, as its emissions decreased by 52%. The second in row was the basic metals industry, contributing on average 15%. Emissions by this industry declined

only by a third between 1990 and 2007. Consequently, its share rose over the period investigated. The electricity, gas, steam and hot water industry accounted for 10% on average of total industries' photochemical emissions. As for land transport, its share decreased. Its emissions declined by 55% between 1990 and 2007.

Households accounted for just over a quarter of all tropospheric ozone precursor emissions. Their emission levels dropped by 44% between 1990 and 2007. Transport activities accounted for 71% of total household photochemical emissions on average. Their share decreased, however, as emissions from household transport dropped by 55% between 1990 and 2007. Emissions due to household heating only declined by 14%, while emissions of tropospheric ozone precursors deriving from other household activities rose by 3% over the same period.

Data on particulate matter are only available as from the year 2000. For both PM_{10} and $PM_{2.5}$ the emissions dropped by around one third between 2000 and 2007. Most particulate matter emissions were caused by the industries. For PM_{10} their share was just under 90% on average, for $PM_{2.5}$ around 85%. The industries emitting most PM_{10} were the basic metals industry, land transport, agriculture and the other non-metallic minerals industry. The basic metals industry had a share of around one quarter on average in both types of particulate matter emissions. Its share was falling, however, as their emissions dropped by 50% between 1990 and 2007. The second most important contributor as concerns PM_{10}, was agriculture with an average share of 23%. Its share increased between 1990 and 2007, because its emissions declined only by 7%. Its share in $PM_{2.5}$ was only 13% on average. For fine particulate matter land transport was the second most important contributor with a share of 17% on average.

Particulate matter generated by households declined almost by a fifth between 2000 and 2007. More than half of household particulate matter emissions were caused by transport, but its share diminished from 58% in 2000 to 53% in 2007.

CFC emissions declined by 84% between 1995 and 2007, HCFC emissions by 63%. Households accounted on average for about one fifth of total CFC emissions, while they emitted less than 4% of total HCFC emissions. The lion's part of CFC and HCFC emissions was caused by the manufacturing industry, which accounted for around 40% of CFC emissions and for about two thirds of total HCFC emissions.

3.2 Analysis

The AEA constitute a database on air pollution which can be linked to economic data. As such different types of analysis become possible. Two straightforward types of analysis are the construction of environmental-economic profiles and the calculation of emission intensities. Environmental-economic profiles make a comparison between the contribution of different industries to the economy and their contribution to air pollution. The emission intensity of an industry shows the amount of pollution it generates per unit of an economic variable, like employ-

ment or value added. The evolution of the emission intensity of an industry can be interpreted as a measure of the eco-gains or eco-losses that the industry has realised over time.

Environmental-economic profiles were constructed for the aggregated industries and the industries which contributed most to the different types of air pollution for the year 2007. The primary producers had only a tiny share in total employment (2%) and value added (1%). Still, their share in emissions of certain pollutants was very large. For ammonia it amounted to 95% of total industries' emissions, for methane to 79%, for nitrous oxide to 60%, for PM_{10} to 36% and for $PM_{2.5}$ to 20%. Agricultural activities were the main cause of these large shares in total emissions for the primary producers. The manufacturing industry generated 17% of value added in 2007 and 14% of total employment. At the same time it accounted for 40% of total industries' energy consumption. As a consequence, it also accounted for a large share of air pollution, to wit 47% of tropospheric ozone precursors, 41% of the Kyoto greenhouse gases and 33% of acidifying gases. The most polluting manufacturing industries were the coke and refined petroleum products industry, the chemical industry, the other non-metallic minerals industry, and the basic metals industry. The energy industry only accounted for between 1% and 2% of total industries' employment and value added in 2007. Its share in energy use was as high as 30%, however. Consequently, its share in greenhouse gas emissions was as high as 21%, while its share in acidifying and photochemical emissions was between 8% and 9%. The construction industry had a share of 6% in employment and 5% in value added in 2007. Its share in energy use and air pollution was a lot smaller. The trade industry accounted for 14% of all Belgian employment and created 13% of all value added in 2007. Its share in most types of air pollution was small. However, as concerns HFC, PFC and HCFC the trade industry was an important polluter. It accounted for 17% of total industries' HFC emissions, 15% of PFC emissions and 10% of HCFC emissions. The transport industry accounted for 5% of total employment in Belgium in 2007, and 6% of value added. Its share in pollution was a lot higher, especially concerning tropospheric ozone precursors. The transport industry accounted for 29% of total industries' photochemical emissions. It also accounted for 23% of fine particulate matter emissions. The other services industry, including among others restaurant services, financial intermediation services, business support services, education, and health services, was the largest contributor to employment and value added in Belgium. In 2007 it accounted for 59% of employment and created 56% of all value added. Its share in most types of air pollution was small, except for the fluorinated gases. It accounted for 47% of total industries' PFC emissions, 41% of total CFC emissions and 21% of total HCFC emissions.

The emission-intensity of the Belgian industries decreased between 1995 and 2007. Emissions of all types of air pollutants decreased per unit of value added as well as per unit of employment. In other words, the Belgian economy achieved clear-cut eco-gains. This was not the case for each and every single industry, however. Of the most important greenhouse gas emitting industries, the other non-metallic minerals industry, the coke and refined petroleum products industry, and the land transport industry all incurred eco-losses with respect to value added. The most greenhouse gas intensive industry was air transport, with an emission of 10.7 kg per

euro of value added in 1995, almost 20 times higher than the greenhouse gas intensity of total industries. Despite a drop to 8.7 kg per unit of value added in 2007, its emission intensity relative to the total economy increased. The most acidifying gas intensive industry was agriculture. Per thousand euro of value added it emitted over 3 tonnes of hydrogen ions in 1995. Agriculture achieved a considerable eco-gain, and in 2007 its emissions per thousand euro of value added had fallen below 2 tonnes. Still, this was 46 times higher than the acidifying gas intensity of the total economy. Except for the printing industry all industries achieved eco-gains between 1995 and 2007 in the field of acidification. As a consequence, total industries' acidifying gas intensity was more than halved. This was also the case for tropospheric ozone precursors, for which only the tobacco industry incurred an eco-loss. Air transport was the most photochemical gas intensive industry. Despite an eco-gain of 47% it remained almost 30 times more intensive in tropospheric ozone precursors than total industries. When the emission-intensity is evaluated with respect to employment the eco-gains are less pronounced. There are clearly more industries with eco-losses between 1995 and 2007. The difference between the eco-gains and eco-losses when evaluated with respect to value added on the one hand and with respect to employment on the other hand are a consequence of the increased productivity of labour, expressed as value added per employee.

The AEA can also be used for more complex types of analysis involving input-output tables. Two applications of input-output tables to air emissions data are demonstrated for Belgium. The first application allocated air emissions by the Belgian producers to final demand, both by final demand category and by product, for the years 2000 and 2005. This enabled us to determine which categories of final demand, and within those categories, which products generated the highest amount of air pollution both directly and indirectly in those years. The second application of input-output tables to air emissions data looked into environmental leakage of air pollutants for Belgium during the period 1995-2004.

Approximately 60% of total emissions of greenhouse gases, acidifying gases and tropospheric ozone precursors by Belgian producers were due to export demand. For particulate matter and atmospheric ozone depleting substances the share of exports was even higher, at least in 2000. The share of exports in air pollution by the Belgian producers exceeded its share in total final demand to a large extent. This shows that exports are far more pollution intensive than the rest of final demand. The second most important final demand category, both in 2000 and in 2005, was consumption by households. A quarter of all greenhouse gases emitted by the Belgian producers was due to household consumption. This corresponds exactly to the share of household consumption in total final demand. Household consumption also accounted for almost 30% of acidifying emissions by the Belgian producers and around a fifth of photochemical emissions and emissions of particulate matter. Investment was responsible for between 7 and 10% of emissions by the Belgian producers. Its share in air pollution was lower than its share in total final demand for most air pollutants. The share in air pollution by the Belgian producers of consumption by the government was much lower than its share in total final demand. In 2000 consumption by the government caused 3-4% of emissions by the Belgian producers, while in 2005

its share was more in the neighbourhood of 5-6%. The shares of consumption of non-profit institutions serving households and changes in stocks were very small, both in total final demand and in air pollution.

Basic chemicals[1] were the most important generator of greenhouse gas emissions for exports. They accounted for 14% of greenhouse gas emissions in 2000, while in 2005 their share had risen to 16%, despite a decrease in their greenhouse gas pollution coefficient. The share of exports of basic iron and steel, the second most important generator of greenhouse gases for exports, decreased slightly, from 13% in 2000 to 12% in 2005, as its greenhouse gas pollution coefficient fell. As far as acidifying emissions for exports are concerned, agricultural products alone already accounted for over 10%. Exports of basic iron and steel were the main source of NO_x and SO_x emissions for exports in both 2000 and 2005, and its share increased. As a consequence, it was the third most important product in the total acidification ranking in 2000, with a share of 8%, and it moved into second place in 2005, with a share of 9.5%. Exports of basic chemicals followed in its footsteps, its share rising from just below 6% to over 8%, as its share in both NO_x and SO_x emissions clearly increased. As concerns photochemical pollution for exports, the two most important products, basic iron and steel and basic chemicals, both increased their share, and in 2005 exports of these two goods together already accounted for over a quarter of the total. Exports of basic iron and steel, cold steel products and non-ferrous metals together accounted for more than a third of particulate matter emissions for exports. Around 14-15% of PM_{10} emissions were caused by exports of agricultural products and other mining and quarrying products. Their share in fine particulate matter emissions was a lot smaller. Exports of basic iron and steel also played a major role in emissions of atmospheric ozone depleting substances by the Belgian producers, and its share increased substantially between 2000 and 2005. Exports of basic chemicals were also among the major sources of emissions of ozone depleting substances for exports, and its importance increased as well.

Compared to the most polluting export products, the most polluting household consumption products look entirely different. This is due to the fact that intermediate products are an important part of exports. The most important product for producer greenhouse gas emissions in the household consumption basket was clearly electricity. By itself it already accounted for about a fifth of the total. Agricultural products, meat and meat products, and retail trade services are also among the main household consumption products inducing greenhouse gas emissions by the Belgian producers. As concerns acidifying emissions, household consumption of agricultural products alone already accounted for a quarter of the total in 2005, up from 17% in 2000. In 2000 meat and meat products accounted for almost a fifth of the total. Its share was almost halved by 2005. Household consumption of electricity accounted for just above 10% of total acidifying emissions for household consumption. Just like in the case of greenhouse gases, electricity was also the household consumption product with the largest impact on photochemical emissions for household consumption by the Belgian producers. Retail trade services were the

[1] These include among others industrial gases, colouring matters, plastic and synthetic rubber.

second most important product. Railway transport, scheduled passenger transport by road and travel agency services together accounted for a quarter of the total in 2000. In 2005 their share decreased significantly, and agricultural products entered the top-5 of the products which generate most tropospheric ozone precursors for household consumption. As concerns particulate matter emissions for household consumption, agricultural products and meat and meat products were responsible for over a third of coarse particulate matter emissions and almost a quarter of fine particulate matter emissions. The importance of transport related products decreased between 2000 and 2005.

The most polluting investment goods differ substantially from the most polluting exports and household consumption goods. General construction work for buildings and civil engineering work was the prime investment product responsible for air polluting emissions by the Belgian producers for investment goods. In 2000 it accounted for over half of the total for almost every type of air pollution. In 2005 it still accounted for almost 40% of the total of each type of pollution. The reason why construction work is the product inducing most air pollution is to be found in the production of all the inputs that are needed. Construction work itself is not very polluting. The pollution coefficients for these products are rather low. However, the elaborate use of steel, cement, concrete, stone and glass generates a large amount of air pollution during the production of these intermediate goods.

The previous analysis showed that exports are the main cause of air polluting emissions by the Belgian producers. Since trade is so important for a small open economy like Belgium, the issue of environmental leakage is not to be ignored. The study of environmental leakage for Belgium started with the calculation of the balance of emissions embodied in trade. The balance of emissions embodied in trade is equal to the difference between direct and indirect emissions embodied in imports and direct and indirect emissions embodied in exports. A positive value of the balance of emissions embodied in trade means that pollution embodied in imports exceeds domestic emissions associated with exports. If this is the case one can say that the country is a net exporter of emissions. If the country would have to produce the imported goods by itself, instead of obtaining them in exchange for exports, its emissions as measured by the production approach would be higher. It is thus, in effect, exporting these emissions. Over the complete decade running from 1995 until 2004 Belgium imported CO_2, HFCs, PFCs, NO_x, NMVOC, CO, CFCs and HCFCs, while it exported N_2O, CH_4, SF_6, SO_x, NH_3, PM_{10} and $PM_{2.5}$. Despite the imports of CO_2, HFCs and PFCs, total greenhouse gases expressed in tonnes of CO_2-equivalents were exported. Greenhouse gases embodied in Belgian imports were more than 6 million tonnes of CO_2-equivalents higher than greenhouse gases embodied in Belgian exports. During the 1995-2004 decade Belgium was also a net exporter of acidifying emissions. Acidifying emissions embodied in imports outstripped likewise emissions embodied in exports by 8561 tonnes of hydrogen ion equivalents. Photochemical emissions embodied in exports were almost 160 thousand tonnes of NMVOC-equivalents higher than such emissions embodied in imports in the period 1995-2004. Consequently, Belgium was a net importer of this type of emissions. Belgium emitted more of this type of emissions than necessary for its own use.

The balance of emissions embodied in trade is exactly equal to the difference between a country's emissions calculated according to a production approach and the same country's emissions calculated according to the avoided emissions approach. When this difference is shown as a percentage of emissions according to the production approach, we obtain a value for environmental leakage. Environmental leakage shows how important the difference is between emissions embodied in imports and emissions embodied in exports. When environmental leakage is positive, this implies that imports contain more pollutants than exports, or in other words that the country is exporting this pollutant to its trade partners. When environmental leakage is negative, exports contain more pollutants than imports, which signifies that the country is importing this pollutant. It is polluting its own country for the rest of the world.

In 1995 Belgium was a net exporter of acidifying emissions, amounting to 5% of Belgian emissions according to the production approach, and a net importer of tropospheric ozone precursors, equal to a value of 3% of Belgian industry emissions. As concerns greenhouse gases trade was balanced. Between 1995 and 1999 positive environmental leakage decreased, while negative environmental leakage increased in absolute value for most of the pollutants. These changes can be caused by two factors, a change in the balance of emissions embodied in trade on the one hand, and a change in emissions according to the production approach on the other. Since the balance of emissions embodied in trade was the determining factor, we can state that in general Belgium increasingly polluted more in order to satisfy demand in the rest of the world than the reverse. By 1999 it had consequently become a net importer of greenhouse gases as well as of tropospheric ozone precursors, while acidifying emissions embodied in trade were in balance. However, as of 2000 the situation changed radically. Environmental leakage started to increase, and by 2004 Belgium had become a net exporter of all pollutants but CO, CFCs and HCFCs. As a consequence, net exports of greenhouse gases reached 7% of total Belgian industry emissions, net exports of acidifying emissions 10% and net exports of tropospheric ozone precursors 2%. Once again, the evolution of the balance of emissions embodied in trade was the determining factor. This implies that between 1999 and 2004 Belgium has increasingly avoided generating emissions of air pollutants by having products leading to this pollution produced abroad. But was this evolution due to a real change in the composition of trade, or was it simply the reflection of changes in the global trade balance ? In order to investigate this we calculated the environmental terms of trade.

The environmental terms of trade are obtained by dividing the average environmental intensity of exports for a certain pollutant by the average environmental intensity of imports for that same pollutant. Values for the environmental terms of trade exceeding one indicate that a thousand euro worth of exports of a certain country embody a higher amount of a particular pollutant than a thousand euro worth of its imports. If the changes in the Belgian balance of emissions embodied in trade were not just a reflection of global trade balance evolutions, then the average environmental intensity of exports should have increased relative to the average environmental intensity of imports between 1995 and 1999, while the opposite should be true for the period between 1999 and 2004.

When considering the individual pollutants, one can observe that in 1995 for almost two thirds of the pollutants Belgian exports were more environment intensive than imports. By 1999 this share had increased to three quarters. So, Belgian exports became more environmentally intensive with respect to its imports between 1995 and 1999. This corroborates with the evolution of the balance of emissions embodied in trade. The latter was thus not only influenced by the evolution of the trade balance, but also by a change in the composition of trade. In the second period, between 1999 and 2004, this is also true. The environmental terms of trade dropped for all the pollutants. Consequently, by the end of the period the environmental intensity of imports exceeded the environmental intensity of exports for four fifths of the individual pollutants. Belgium has been having the air emission intensive goods and services it uses produced more and more abroad compared to its own production of air emission intensive goods and services for the rest of the world.

This does not necessarily imply that the environmental intensity of imports has risen, of course. It may just have dropped at a slower rate than the environmental intensity of exports. This was indeed the case for most of the pollutants, with carbon dioxide, carbon monoxide and coarse particulate matter as notable exceptions. The carbon dioxide intensiveness of Belgian exports decreased by 5% between 1999 and 2004, while the carbon dioxide intensiveness of Belgian imports increased by 12%. Since in both cases the Belgian emission coefficients and production technology have been applied, this clearly demonstrates that Belgium has offshored carbon dioxide intensive, and thus also greenhouse gas intensive, activities during the first half of the noughties.

Another indicator that can shed a light on the fact whether or not a country has been offshoring polluting activities is the change in the relative average environmental intensity of imports, relative that is with respect to the average environmental intensity of domestic production for domestic use. Since goods, in contrast to services, constitute a far larger portion of trade than of total domestic final demand, while the environmental impact of the production of goods is in general larger than the environmental impact of the production of services, one can expect the environmental intensity of imports to be larger than the environmental intensity of domestic production for domestic use. In 1995 Belgian imports were around 80% more environmentally intensive than domestic production for domestic use. By 2004 the environmental intensity of Belgian imports had become about double as large as the environmental intensity of domestic production for domestic use. The relative environmental intensity of Belgian imports has been growing since 1995. This is not due to an increase in the importance of less polluting services in domestic final demand. The share of these services was even somewhat smaller in 2004 than in 1995. This signifies that the more polluting activities necessary to satisfy domestic final demand in Belgium have been performed to an increasing extent by foreign producers. Whereas in the period 1995-1999 this was the case especially for activities leading to emissions of tropospheric ozone precursors, in the period 1999-2004 Belgium witnessed a marked increase in the offshoring of greenhouse gas intensive activities.