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The impacts of energy and carbon taxation in Belgium

Analysis of the impacts on the
economy and on CO₂ emissions

F. Bossier,
I. Bracke,
F. Vanhorebeek



**Federal
Planning Bureau**
Economic analyses and forecasts

Avenue des Arts 47-49
B-1000 Brussels
Tel.: (02)507.73.11
Fax: (02)507.73.73
E-mail: contact@plan.be
URL: <http://www.plan.be>

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Federal Planning Bureau

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Introduction

This working paper brings together three analyses that were carried out by the Federal Planning Bureau at the request of the Secretary of State for Energy and Sustainable Development and the Minister for Consumer Affairs, Public Health and the Environment. It looks at the harmonisation (increase) in energy levies up to the average level in our neighbouring countries and the introduction of a CO₂ levy. In the case of the CO₂ levy we analyse both the situation whereby all energy products are taxed and the case where the levy is only applicable to road transport. All policy variants are intended to reduce CO₂ emissions in Belgium within the context of the Kyoto Protocol. The analyses presented in this working paper were finalized in September 2001.

It should be pointed out that there are differences between the scenarios in terms of the scope of the levies (the estimated revenue yield). The results of the variants - in both economic and environmental terms - cannot, therefore, be simply compared with each other. What is more, the use or non-use of the tax revenue (e.g. to reduce social security contributions or finance further investment) is very important in determining their impact on economic activity.

Most of the simulations cover the period from 2002 to 2012. In each case their impact is discussed on the macro-economy, sectors, public finances, energy consumption and CO₂ emissions. The exercises have been built using the macro-sectoral model HERMES (April 2001 version), on the basis of a base simulation corresponding to the medium-term forecast for 2001-2006 issued in April 2001¹, extended to cover the period from 2007 to 2012. The characteristics of the base simulation are described in Chapter III.

Chapter IV analyses the effects of higher energy levies. The first variant concerns the alignment of taxation of energy products with the average levels calculated for Belgium's three neighbouring countries (France, Germany and the Netherlands). The study takes as its reference point the taxation rates that were in force in 1999. It is clear that the various taxes on energy (excise duty, other specific taxes and VAT) have evolved since that date. In this context, taking into account the changes which have taken place since then could alter the results, without, however, calling the conclusions into question. In this variant the tax revenue remains in the treasury and the government does not finance any new initiatives. In a second variant the tax revenue is all used to reduce social security contributions. The share of the tax that is paid by households is then offset by a reduction in employ-

1. See *Economische vooruitzichten / Perspectives économiques 2001-2006*, April 2001. The variants in Chapter IV are an exception to this. They were simulated in February 2001, using a model version ending in the year 2010.

ees' social security contributions. The share that is paid by companies is returned to them via a reduction in employers' contributions.

Chapter V considers the impact of a tax on CO₂ emissions on the Belgian economy. Two different levels of CO₂ tax are simulated. The first level of tax is EUR 11.5 per tonne of CO₂ (at 1990 prices). This corresponds to the tax put forward in the Proposed National Climate Plan. The second level is EUR 26.2 per tonne of CO₂ (at 1990 prices). This level corresponds to an equilibrium price for emissions rights as calculated in a European study which assumes that the EU will achieve the Kyoto target through trading in emissions rights between EU countries without further international trading in emissions rights. For both levels of CO₂ levy two simulations are carried out, namely with and without redistribution of the CO₂ tax revenue by the government. As in Chapter IV, the redistribution takes place in the form of a reduction in social security contributions.

Chapter VI sets out the effects of introducing a CO₂ tax on the road transport sector. This tax would amount to the equivalent of EUR 20.33 per tonne of CO₂ for a whole year, which comes down to increasing the tax on liquid fuels by EUR 0.07 per litre (tax increase excluding VAT). The scenario which is analysed anticipates redistributing all the revenue from the new tax. This redistribution could take place by two methods. In the first variant, the additional revenue would be used to reduce employer's and employee's social security contributions. In the second variant a proportion of the additional revenue (40%) would be injected directly back into the transport sector, via investment in public transport.

Additional data in relation to the results of the simulations can be found in Chapters VII to IX.



Key findings

The first section of Table 1 summarises the main characteristics of the variants that do include redistribution of the proceeds of energy or CO₂ levies. The *ex ante* tax revenue in the various scenarios diverges considerably. Except in the case of the last variant, this is fully returned through a reduction in the social security contributions made by households and firms. With the exception of the first variant, the medium-term results refer to the year 2012¹.

With regard to macro-economic results, the impact on GDP is slightly positive. The adverse effect on domestic demand, both in terms of private consumption (loss of purchasing power) and in terms of investment, is more than compensated for by the fall in import requirements (particularly in the energy domain).

The measure will, of course, have a direct impact on consumer prices, but this will be tempered by the favourable effect of lower employers' social security contributions on production prices. Since the measure refers to increases in the price of energy products, its impact on the health index will be much smaller than on the general consumer price index.

The results in terms of employment are positive, but highly divergent. The best results are obtained for the general CO₂ levy, where 70% of the total *ex ante* tax revenue (which is already higher in any case) flows back via a reduction in employers' social security contributions. In the other variants the total is divided approximately equally between reductions in employers' and employees' contributions.

In most cases the impact on government finances - despite the redistribution of the tax revenue - is slightly positive. This result can largely be attributed to the increase in economic activity and the reduction in employees' social security contributions, leading to increased revenue from direct taxation.

Finally the table shows the results in relation to energy-related CO₂ emissions. According to the Kyoto Protocol Belgian emissions should fall by 7.5% in 2008-2012 in comparison with the level of emissions in 1990 (107.7 million tonnes). Since the base projection forecasts a level of emissions of 125.2 million tonnes in 2012, this means that CO₂ emissions need to fall by 20% in the medium term in comparison with the base simulation. The 'incentives' simulated in this working paper prove - even in the case of an extensive fiscal measure such as the general CO₂ levies - to be insufficient by far in order to meet this commitment.

1. This is because the first variant was simulated in February 2001, using a model version ending in the year 2010.

The conclusion is therefore that levies on energy consumption should be seen as just one part of an overall package of measures aimed at cutting CO₂ emissions.

TABLE 1 - Main characteristics and results of the variants involving redistribution of tax revenue
(differences in % in relation to the base simulation, unless otherwise indicated)

	Energy levies	CO ₂ levy, 'National Climate Plan' version	CO ₂ levy, 'Tariff according to emissions trade' version	CO ₂ levy on transport, scenario I	CO ₂ levy on transport, scenario II
Paid by	general	general	general	transport sector	transport sector
Ex ante tax revenue in the medium term					
. in EUR billions	1.80	2.35	5.16	0.57	0.57
. in % of GDP	0.46	0.55	1.21	0.13	0.13
Redistribution via social security contributions	100 %	100 %	100 %	100 %	60 %
Redistribution via investment	0 %	0 %	0 %	0 %	40 %
Short term	2002	2002	2002	2002	2002
Medium term	2010	2012	2012	2012	2012
GDP					
. short term	-0.05	-0.00	-0.01	-0.00	0.00
. medium term	0.02	0.10	0.22	0.04	0.05
Private consumption					
. short term	-0.11	-0.02	-0.04	-0.01	-0.01
. medium term	-0.32	-0.10	-0.21	-0.08	-0.11
Gross investment					
. short term	-0.27	-0.09	-0.20	-0.02	0.03
. medium term	-0.43	-1.18	-2.37	0.06	0.29
Imports					
. short term	-0.10	-0.03	-0.07	-0.01	-0.01
. medium term	-0.30	-0.39	-0.82	-0.06	-0.03
Consumer prices					
. short term	0.27	0.05	0.11	0.03	0.03
. medium term	0.57	0.40	0.87	0.20	0.22
Health index					
. short term	0.03	0.01	0.02	0.00	0.00
. medium term	0.00	0.11	0.21	0.01	0.03
Employment (differences in thousands)					
. short term	-1.74	0.05	0.10	0.00	-0.01
. medium term	2.96	9.47	21.76	1.86	1.16

	Energy levies	CO ₂ levy, 'National Climate Plan' version	CO ₂ levy, 'Tariff according to emissions trade' version	CO ₂ levy on transport, scenario I	CO ₂ levy on transport, scenario II
Real households' disposable income					
. short term	-0.09	-0.01	-0.03	-0.01	-0.01
. medium term	-0.29	-0.10	-0.19	-0.08	-0.11
Balance of current transactions with the rest of the world (differences in % of GDP)					
. short term	0.07	0.03	0.07	0.01	0.00
. medium term	0.25	0.43	0.90	0.05	0.02
Government net lending					
Differences in EUR millions					
. short term	-12	4	8	5	3
. medium term	408	265	597	107	-5
Differences in % of GDP					
. short term	-0.01	0.00	0.00	0.00	0.00
. medium term	0.08	0.05	0.11	0.02	-0.01
Final energy use					
. short term	-0.41	-0.35	-0.75	-0.04	-0.04
. medium term	-1.55	-3.69	-7.30	-0.28	-0.28
CO₂ emissions					
. short term	-0.69	-0.40	-0.86	-0.07	-0.07
. medium term	-3.41	-5.45	-10.00	-0.90	-0.90



Characteristics of the base simulation

The figures for the period from 2001 to 2006 correspond to the medium-term forecasts published in April 2001 by the Federal Planning Bureau¹. The forecasting period is usually four to six years, but it can be extended to 10 years if necessary. For the purposes of this analysis the simulation period used in the HERMES model has been extended to 2012.

A. International environment

Table 2 sets out the main hypotheses in relation to the international environment. The information concerning the international environment during the period from 2001 to 2006 is based mainly on the forecasts by the European Commission and the OECD. For the period from 2007 to 2012 no 'external' information is available, so that the international context for that period is based on trend growth over the past 20 years. In the medium term, world inflation in euro terms should stabilise at around 1.8%. This development reflects a slight appreciation of the euro against the dollar in the medium term, inflation of almost 2% in the euro zone and stable evolution of raw materials prices. Energy prices always follow the pace of world inflation.

TABLE 2 - Main hypotheses concerning the international environment
(average annual growth rates, unless otherwise indicated)

	2001-2006	2007-2012	2001-2012
Potential export market for Belgium	6.4	5.7	6.1
World prices excl. energy in USD	2.4	2.4	2.4
World prices excl. energy in EUR	1.7	1.8	1.8
Oil price (Brent, average price in USD per barrel)	26.6	30.6	28.6

B. Macro-economic and sectoral evolution

Table 3 shows the main macro-economic and sectoral characteristics of the base simulation in the form of averages.

The growth figures during the period from 2001 to 2006 are more favourable than those during the period from 2007 to 2012. One reason for this is dynamic domes-

1. Federal Planning Bureau, *Economische Vooruitzichten / Perspectives économiques 2001 - 2006*, April 2001.

tic demand. More specifically, private consumption has received a boost from fiscal reforms, giving rise to a gradual increase in household purchasing power. During the period from 2007 to 2012 this effect will have run its course and private consumption will return to its trend growth path.

The second reason is the international context. Exports should increase by an average of 5.9% per annum during the period from 2001 to 2006 and by 5.1% during the period from 2007 to 2012. Import requirements are also greater during the first half of the simulated period (average growth of 5.9%), due to the effect of dynamic domestic demand.

Overall the average contribution to economic growth from both domestic demand and net exports will be smaller during the period from 2007 to 2012 than in the years from 2001 to 2006. As a result, average economic growth will be only 2.4%, having been 2.7% during the first half of the simulation period.

Belgian inflation should accelerate somewhat to reach an average of 2% during the period from 2007 to 2012.

Economic growth has a favourable effect on activity in industrial sectors, although this effect is certainly more pronounced during the period from 2001 to 2006 than between 2007 and 2012. The manufacturing sectors - which are export-sensitive - will benefit from the recovery in the international economy during the period from 2001 to 2006. The construction sector will become more dynamic during this period thanks to dynamic corporate demand for investment. The growth in market services will also be supported by domestic and foreign demand during the period covered by the simulation.

TABLE 3 - Key macro-economic and sectoral results of the base simulation
(average annual growth rates, unless otherwise stated)

	1995-2000	2001-2006	2007-2012
Demand and production (at constant prices)			
- Private consumption	2.0	2.6	2.1
- Government consumption	1.8	1.6	1.9
- Gross investment	4.3	3.5	3.2
. Firms	5.5	4.0	3.5
- Total domestic demand	2.4	2.6	2.4
- Exports	5.6	5.9	5.1
- Total final demand	3.9	4.3	3.9
- Imports	5.4	5.9	5.3
- GDP	2.7	2.7	2.4
Prices and interest rates			
- Private consumption	1.7	1.8	2.0
- Health index	1.4	1.9	2.1
- GDP deflator	1.3	2.0	2.1
- Long-term interest rate (10 years)			
. nominal	5.8	5.5	5.8
. real	4.1	3.8	3.8
Employment and unemployment			
- Total employment			
. change in thousands	37.9	39.5	24.7
. percentage change	1.0	1.0	0.6
- Level of unemployment, FPB definition	14.0	12.0	10.6
- Productivity per hour (market sector)	2.3	2.0	1.9
Value added by branch (at constant prices)			
- Agriculture	4.0	1.6	1.3
- Industry	3.0	2.7	2.1
. Energy	3.4	1.9	2.0
. Manufacturing	3.4	2.7	1.9
- Intermediate goods	4.0	2.8	2.1
- Equipment goods	3.8	2.8	1.6
- Consumption goods	2.5	2.5	1.7
. Construction	1.3	3.3	3.3
- Market services	2.7	3.4	2.9
. Transport and communication	2.7	3.5	3.0
. Retail, hotel and catering	-1.0	2.4	1.7
. Credit and insurance	11.4	3.3	3.6
. Health care	0.8	3.1	2.9
. Other market services	4.7	3.9	3.4
Total for all market sectors	2.9	3.1	2.6

C. Modelling the power generation sector

Table 4 shows the structure of electricity production during the simulation period. This shows that the generation of electricity from wind and hydro would increase sharply during the second half of the simulation period. The largest proportion of the increase in capacity is forecast to take place after 2006. In 2012 the wind and hydro power production is estimated to be 3.1 TWh. This corresponds to the estimates from various sources¹. This estimate does not necessarily correspond to the objectives set out by the European Commission or the Belgian government. Production by nuclear power stations is kept constant throughout the simulation period. As regards other power stations, we assume that production will continue to increase. This growth would be entirely attributable to power generation from natural gas, using combined cycle gas turbines and other thermal power stations. Otherwise the proportion of gross domestic power consumption accounted for by electricity imports would increase slightly in the base simulation.

TABLE 4 - Production of power stations
(TWh)

	2000	2002	2006	2012
Water and wind power	0.4	0.6	1.0	3.1
Nuclear power stations	47.3	48.2	48.2	48.2
Thermal power stations	35.4	36.6	42.7	51.8
- Oil products	0.6	0.8	0.9	0.9
- Blast furnace and coke gas	2.6	2.7	2.5	2.1
- Natural gas	17.3	22.5	31.3	43.2
- Biomass and waste	1.5	1.5	1.5	1.5
- Other fuels	0.5	0.5	0.5	0.5
- Coal	12.9	8.6	5.8	3.5
Total	83.1	85.4	91.9	103.1

1. See inter alia AMPERE Commission and the results in *Energievooruitzichten/Perspectives énergétiques 2000-2020*. Planning Paper no. 88 from the Federal Planning Bureau, January 2001.

D. Final energy consumption and greenhouse gas emissions in the base simulation

The expected evolution of final energy consumption shows significant sectoral differences, as is shown in Table 5.

TABLE 5 - Evolution of final demand for energy by sector
(average annual growth rates)

	2001-2006	2007-2012	2001-2012
Industry	0.6	-0.3	0.2
Transport	2.1	1.9	2.0
Households and services	1.2	1.2	1.2
Total	1.3	0.9	1.1

While an increase in total final energy consumption of 1.1% per annum on average is expected during the base simulation, final consumption by industry should increase by only 0.2% on average. Relatively high energy prices during the forecast period will encourage industry to make further investments in energy-friendly technologies with a view to more efficient energy consumption. The change in industrial energy consumption which has already been seen from solid and liquid fuels towards gas and electricity is confirmed during the base simulation.

In the transport sector, an increase in consumption (mainly oil products) is expected of 2% per annum on average. This is more rapid growth than the increase in total final consumption. This development confirms earlier trends. The final level of consumption by households and services will increase at a rate which is approximately equal to the average annual growth in the total final demand for energy. Gas and electricity will also become more important for this sector at the expense of liquid fuels.

Figure 1 shows the evolution of energy-related CO₂ emissions from 1980 to 2012. During the base simulation energy-related CO₂ emissions should increase by an average of 0.5% per annum. During the period from 1990 to 2000 this was still 1% per annum on average. This limited increase is due, among other things, to:

- more efficient energy consumption due to increasing use of energy-efficient technologies;
- a further decline in the importance of energy-intensive sectors, in favour of less energy-intensive services;
- a further shift in the structure of energy consumption away from solid and liquid fuels and towards gas and electricity.

The sharp fall in energy-related CO₂ emissions at the beginning of the 1980s was related to the restructuring of heavy industry, high energy prices and the restructuring of the power generation sector with the construction of nuclear power stations.

FIGURE 1 - Evolution of energy-related CO₂ emissions
(millions of tonnes)

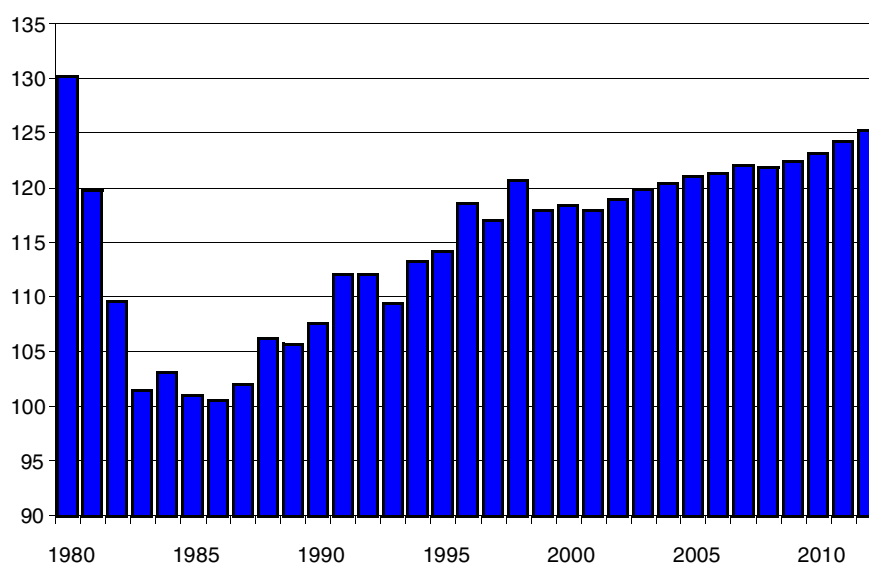


Table 6 shows the development of energy-related CO₂ emissions per sector in the base simulation. Emissions caused by the transport sector are expected to rise by 2.1% on average during the forecast period. This is due to the rapid growth in energy consumption, consisting mainly of liquid fuels. Emissions caused by households and services should rise by 1% per annum on average. Emissions from the energy sector should increase by 0.2% per annum. Emissions from this sector are largely dependent on the structure of power generators (see above). The evolution of power generators in the base simulation anticipates that natural gas will make significant progress, replacing solid and liquid fuels, and also forecasts higher average yields. One example of this is the combined cycle gas turbines, the so-called STEG power stations and other thermal power stations. Industrial emissions, on the other hand, should fall by an average of 1.3% per annum as a result of the structural shift in energy consumption away from solid and liquid fuels and towards gas and electricity, the fall in the significance of energy-intensive sectors in favour of less energy-intensive services and more efficient energy consumption due to the use of energy-friendly technologies. The table also shows that the expected level of total energy-related CO₂ emissions is more than 16% higher in 2012 than the level seen in 1990.

TABLE 6 - Evolution of energy-related CO₂ emissions per sector
(millions of tonnes)

	1990	2000	2012	2001-2012 ^a
Energy sector	30.2	30.3	31.2	0.2
Industry	32.0	33.7	28.7	-1.3
Transport	20.2	24.0	31.0	2.1
Households and services	25.4	30.4	34.4	1.0
Total	107.7	118.4	125.2	0.5

a. average annual growth rates.

In addition to CO₂ emissions caused by combustion, emissions are also produced in certain industrial processes (e.g. cement and steel production) and when waste is incinerated. These non-energy related CO₂ emissions should, if policy is unchanged, increase during the base simulation by 2.7% per annum on average to reach 17.5 million tonnes in 2012. This would constitute an increase of 65.4% on the 1990 figure, as is also shown in Table 7. That table shows the expected evolution of emissions of the main greenhouse gases during the forecast period in millions of tonnes of CO₂ equivalent, if policy remains unchanged.

TABLE 7 - Evolution of emissions of the main greenhouse gases

	Millions of tonnes of CO ₂ equivalents			Average annual growth rates	Percentage increase
	1990	2000	2012	2001-2012	1990-2012
Energy-related CO ₂ emissions	107.7	118.4	125.2	0.5	16.3
Non-energy related CO ₂ emissions	10.6	12.7	17.5	2.7	65.4
Total CH ₄ emissions	12.1	11.2	8.1	-2.6	-33.0
Total N ₂ O emissions	9.0	10.9	14.0	2.1	54.7
Total greenhouse gas emissions	139.4	153.1	164.8	0.6	18.2

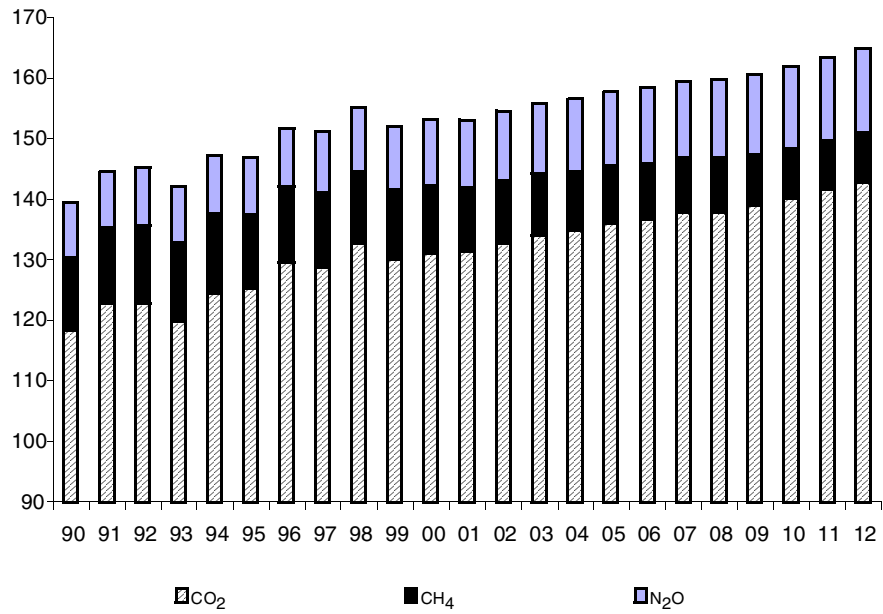
Total CH₄ emissions should fall by an average of 2.6% per annum to reach 8.1 million tonnes in 2012. The fall from 1990 to 2012 would then be 33%. It would be the CH₄ emissions from agriculture and above all from waste processing that are reduced, while energy-related CH₄ emissions and emissions from industrial processes increase.

Unlike the CH₄ emissions, N₂O emissions should increase by an average of 2.1% per annum to reach 14 million tonnes in 2012. The increase between 1990 and 2012 is expected to be 54.7%. Road traffic accounts for a large proportion of this increase.

Total emissions of greenhouse gases should increase by 0.6% per annum on average. In 2012 emissions would reach a level of 164.8 million tonnes, as compared with 139.4 in 1990. This means an increase of 18.2% in comparison with 1990. Without any additional restrictive measures, it will therefore not possible to achieve the target for limiting emissions that was set out in the Kyoto Protocol.

Figure 2 shows the emissions of the main greenhouse gases in millions of tonnes of CO₂ equivalent from 1990 to 2012.

FIGURE 2 - Evolution of emissions of the main greenhouse gases
(millions of tonnes of CO₂ equivalents)





IV Increased energy levies

A. Modalities of the variants

1. Increasing the burden of tax on energy products

The first variant concerns increasing the tax on energy products so that their level reaches the average level calculated (in 1999) for Belgium's three neighbouring countries¹.

This alignment would be supposed to take place gradually, with the operation spread across three years (in this case between 2002 and 2004) and with about one-third of the additional excise duty being introduced each year.

Table 8 gives an indication of the impact of this alignment on the price of various energy products.

TABLE 8 - Impact of the alignment scenario on prices of energy products
(differences in % in relation to the base simulation)

	2002	2003	2004
Electricity (average)	2.4	4.8	6.9
- Electricity (low tension)	3.3	6.4	9.3
- Electricity (high tension)	1.5	2.8	4.1
Liquid fuels	2.9	5.6	8.3
- Petrol	3.6	7.1	10.6
- Diesel	6.0	11.9	18.0
- Heating oil	6.0	11.9	17.4
- Heavy fuel oil	1.7	3.3	4.5
Gaseous fuels	1.5	2.9	4.2
- Natural gas (small-scale consumers)	1.2	2.4	3.3
- Natural gas (large-scale consumers)	1.7	3.4	5.0
Average price of energy	2.4	4.7	6.8

1. The three neighbouring countries in question are the Netherlands, Germany and France.

The price increases diverge quite significantly, according to the initial tax rate, as compared with the rate seen in the three neighbouring countries and the level of prices excluding taxes. The impact is relatively high in the case of diesel, for example (a product which is subject to less tax in Belgium) and significantly lower for high-tension electricity. In total the average price of energy (paid by the final consumer, all categories put together) would be increased by 2.4% in 2002, 4.7% in 2003 and 6.8% in 2004. It is the liquid fuels which undergo the highest price rise on average, while the impact is smaller in the case of electricity and, above all, in the case of natural gas.

Ex ante (before taking into account the effects of the tax on energy consumption), the alignment of the taxation of energy products will give rise to an increase in energy revenues (excluding VAT) of the order of EUR 1.8 billion per full year (which is equivalent to 0.6% of GDP). Table 9 gives a perspective on how this additional revenue is distributed between the sectors involved. In total, *ex ante*, the taxation on households (heating, lighting and the proportion of transportation that can be attributed to them) would be increased by EUR 875 billion, while firms in general would see an increase in taxes of more than EUR 900 billion.

TABLE 9 - Additional revenue from energy taxes
(EUR millions)

	2002	2003	2004
Industry, of which	87	178	268
- Intermediate goods	35	72	107
- Investment goods	5	12	17
- Consumable goods	32	67	99
Private and public services	59	121	183
Households (heating, lighting)	174	347	516
Transport	270	521	793
Miscellaneous	12	22	37
Total	647	1192	1797
in % of GDP	0.24	0.42	0.60

2. Reduction of certain compulsory withholding taxes

The second variant, in parallel with the increase in energy taxes, supposes that this additional tax would be completely redistributed in the form of a reduction in other forms of taxes. This reduction would benefit companies and households, pro-rata on the basis of the additional energy taxes that these would pay in the alignment scenario. By doing this the principle of fiscal neutrality, which has been defended in the draft European Directive on the CO₂/energy tax would be respected.

In concrete terms, redistribution would take place through a reduction in employee's social security contributions (benefiting households) and employer's contributions (benefiting firms). Other methods of redistribution are, of course, possible (for example a reduction in other forms of taxes or using a proportion of

the new revenues to finance efficient energy use campaigns), but these have not been examined within the context of this paper.

The reduction in employers' social security contributions (about EUR 900 billion *ex ante* in 2004) is obtained by reducing the sectoral contribution rates in a uniform way (the reduction amounting to 3.2 points in 2004). On average this leads to a 0.8% fall in the cost of labour.

As regards employees' social security contributions, the reduction in these *ex ante* amounts to the equivalent of 0.5% of household disposable income. Of course the increase in household buying power would be far short of this amount, due to the direct taxation on their income (see the results).

3. Other hypotheses

The other hypotheses in relation to the base simulation have been left unchanged, in particular the international environment and the other hypotheses in relation to domestic policy (non-energy taxation, hypotheses in relation to the labour market etc.)

B. Synthesis of results

Table 10 concerns the alignment variant and the variant involving a redistribution of the new energy revenue in the form of a reduction in social security contributions. It shows the effects of these two variants on GDP and its components, employment, costs and prices, public finances and the current account. The impact is stated for 2002 (the first year of the simulation), 2005 (the intermediate year, in which the measures have already reached their maximum extent) and 2010 (the last year of the simulation), thus making it possible to give a perspective on the medium-term effects¹, and they are expressed as percentage differences in relation to the base simulation.

1. Macro-economic and sectoral results

a. Alignment of energy taxation

As a whole this variant only implies that simply aligning energy taxation will have relatively negative effects on GDP and employment, although these effects will tend to be reduced due to the gradual adaptation of the actors to the new fiscal environment. The volume of GDP will fall by a maximum of 0.33% in relation to its initial level in the base simulation, but will lose only 0.19% in the medium term.

1. Without prejudice to the additional effects that might be revealed by a simulation over a longer period.

TABLE 10 - Key macro-economic results of the variants
(differences in % in relation to the base simulation, unless otherwise indicated)

	Alignment of energy taxation			Alignment of taxation + reduction of social security contributions		
	2002	2005	2010	2002	2005	2010
GDP	-0.11	-0.33	-0.19	-0.05	-0.08	0.02
- Private consumption	-0.22	-0.83	-0.73	-0.11	-0.43	-0.32
- Investment	-0.33	-1.01	-0.76	-0.27	-0.70	-0.43
- Exports	-0.02	-0.14	-0.11	-0.01	-0.05	-0.04
- Imports	-0.13	-0.50	-0.46	-0.10	-0.35	-0.30
Employment	-0.12	-0.35	-0.28	-0.04	-0.03	0.07
Employment (in thousands)	-4.90	-14.48	-12.08	-1.74	-1.27	2.96
Consumer prices	0.32	0.91	0.70	0.27	0.70	0.57
Health index	0.08	0.27	0.14	0.03	0.05	0.00
Government net lending (in % of GDP)	0.12	0.29	0.37	-0.01	0.00	0.08
Balance of current transactions with the rest of the world (in % of GDP)	0.11	0.37	0.38	0.07	0.24	0.25

The fall in GDP is due to reductions in its various components. A reduction in private consumption is observed due to the fall in household disposable income (arising from the increase in indirect taxation, the indexation of some forms of income and transfers to the health index and falls in other non-indexed income) and a fall in investment by firms (deterioration in prospects for development, profitability, rise in interest rates). Exports are also affected (fall in competitiveness).

Table 30, which is set out in Chapter VII, shows that activity will be reduced across all sectors, particularly in the energy and manufacturing sectors and also in services. In 2005 the losses in terms of production volume range from 0.1 (health care sector) to 1.9% (energy). These can be accounted for by the fall in supplies for export (industry) and also for domestic demand (industry and services).

The slowing down of activity will adversely affect job creation: employment will fall by almost 5,000 units from 2002 onwards and by just under 15,000 units in 2005. In the medium term the number of jobs destroyed will be attenuated to some extent, but it will still be as high as 12,000 units in 2010.

The external balance will improve in relation to the base simulation. An increase in the current account surplus will be seen of EUR 0.31 billion in 2002 and EUR 1.22 billion in 2005 (see Table 29). In the medium term, the surplus will be increased by EUR 1.54 billion. This improvement will mainly come from the fall in imports, which is in turn accounted for by lower domestic demand and the reduction in energy consumption (which will both fall by more than 0.3 billion in the medium term). A slight improvement in the terms of trade will also swell the external surplus.

b. Alignment of energy taxation with redistribution

Redistribution of the new energy revenue in the form of a reduction in both employer's and employee's social security contributions will help to limit the

negative impact of the alignment operation on the Belgian economy. In the medium term GDP will even rise slightly in relation to the base simulation, due to the positive effects linked to the fall in the cost of wages and the partial reflation of household purchasing power. GDP will only fall overall by a maximum of 0.11% (in 2004) and will rise very slightly in the medium term. The effects on employment are also more favourable than they were in the first variant: the reduction in the social cost of labour in particular will make it possible to limit the negative effects associated with the initial fall in activity and employment will even rise slightly from 2006 onwards. In the medium term an increase of approximately 3,000 jobs will be seen in relation to the base simulation (and 15,000 in relation to the first variant).

As in the first variant, the scenario including redistribution will make it possible to increase the current account surplus. In this case the surplus will be up by EUR 1 billion at the end of the period (see Table 33), essentially thanks to the fall in imports (a large proportion of which are energy imports).

2. Results for the public finances

The *ex post* impact of the measures under consideration on the public finances will depend on the number of jobs lost or created (revenue from social security contributions and direct taxation, reduction or increase in unemployment benefits), fluctuations in activity (indirect taxation and corporation tax revenues) and on price evolution (indexed expenditure).

a. Alignment of energy taxation

If the revenue from the increase in energy taxes is not redistributed, the State will benefit from a significant increase in its financing capacity. This increase is, however, far from reaching, even in the medium term, the amounts of additional revenue that are calculated *ex ante*. While these figures are expected to reach EUR 1.8 billion per full year (from 2004 onwards), the government financing capacity will only increase by EUR 945 million in 2005 and by EUR 1.52 billion in 2010.

An analysis of the public accounts makes it possible to understand these results.

The evolution of revenue is, of course, dominated by the increase in indirect taxation, but it should be noted that:

- the increase in energy taxes is still lower than the amount initially announced, due to the reduction in energy consumption induced by this measure;
- direct revenue will fall, due to the reduction in activity and employment.

Overall revenue will only increase by EUR 550 million in the first year and by approximately 1.6 billion in 2005 and in the medium term.

The increase in revenue is partly offset by a parallel increase in public spending. Hence an increase in public consumption is observed (increase in the health index and the price of goods and services consumed by the public authorities) and also an increase in transfers to other economic actors (rise in the various price indices and, above all, higher unemployment benefits). Paradoxically, a rise in interest payments is also seen until 2005 (but this is followed by a more logical fall). This momentary rise is due to the rise in nominal interest rates which is also seen. Overall public spending will rise by EUR 210 million in 2002 and EUR 629 million in 2005. In 2010, thanks to the reflux of interest payments, public spending will only rise by EUR 61 million.

TABLE 11 - Results of variants for public finances
(differences in EUR millions in relation to the base simulation)

	Alignment of energy taxation			Alignment of taxation + reduction of social security contributions		
	2002	2005	2010	2002	2005	2010
Current revenue	550	1591	1598	137	424	589
- Direct taxation	-41	-140	-135	109	352	472
- Indirect taxation	597	1745	1814	607	1783	1885
- Social security contributions	-10	-25	-91	-583	-1719	-1776
Current expenditure	210	629	61	143	385	164
- government consumption	42	242	207	16	102	89
- Current transfers	93	307	254	51	110	64
- Interest payments	75	81	-400	76	172	11
Balance of current revenue and expenditure	340	962	1537	-6	39	425
Balance of capital revenue and expenditure	-6	-16	-17	-5	-13	-17
Net lending	334	945	1520	-12	26	408

b. Alignment of energy taxation with redistribution

Where the additional taxes generated by the alignment measure are redistributed, the public financing capacity will change only slightly between 2002 and 2005. In the medium term an increase in State funds of more than EUR 400 million will be observed.

Taking into account the fiscal neutrality option which is maintained in this scenario, a much more limited change in the total revenue takes place than in the previous scenario where no provision was made for redistribution. The reduction in social security contributions virtually compensates for the increase in indirect taxation induced by the measure. The increase in revenue therefore largely comes from an increase in direct taxation, which is itself largely due to the increase in taxable income (thanks to the reduction in employee's social security contributions).

The rise in expenditure is also more modest in this variant, at least between 2002 and 2005. In fact the prices used for indexation of salaries, pensions and miscellaneous transfers will grow at a lower pace than in the variant without redistribution (thanks to the reduction in the cost of labour caused by the reduc-

tion in social security costs) and the more favourable result in terms of employment will give rise to a much more limited increase in social security transfers. In the medium term, on the other hand, the positive effect of shrinking the interest payments will no longer have an effect in this fiscal neutrality variant, and an increase in public spending will be seen in 2010 in relation to the base simulation.

Overall this variant makes it possible to release more net public resources after 2005. The surplus then tends to increase and reaches EUR 408 million by the end of the period.

It is useful to pay more attention to analysing the sectoral challenges in this second variant (Table 12). Since the reduction in the rate of contributions is proportional (approximately 3.2% at the end of the period), it favours more labour-intensive sectors and those for which the implicit rates are highest.

In this way it is possible to link the bill due to the tax on fossil fuels to the amount 'redistributed' *ex ante* in the form of a reduction in social security contributions. Although it is clear that at the aggregated level these two amounts will balance out, the same is evidently not the case at the sectoral level, as Table 12 shows. Hence it is found that the majority of sectors will benefit from the exchange. Notable exceptions are the intermediate goods and consumer goods sectors and, above all, transportation.

TABLE 12 - Alignment of energy taxation with redistribution - amounts paid and redistributed to firms
(EUR millions, in 2010)

	Alignment of energy taxation	Reduction in social security contributions	Difference
Equipment goods	27	72	45
Intermediate goods	117	62	-55
Consumption goods	117	62	-55
Construction	22	54	32
Transport	176	82	-94
Energy	37	82	45
Commercial services	347	491	144

3. Results in relation to energy consumption and CO₂ emissions

In the scenario without redistribution, the reduction in energy consumption induced by the tax is significant and plays an important part in the partial absorption of the shock: from the first year onwards final energy consumption is reduced by 0.43%. In 2005, the year in which the fiscal adjustment has already reached its maximum, consumption falls by 1.44%. In the medium term the fall is even more pronounced. In this case the choice of a sufficiently long simulation period makes it possible to take into account delays in the adjustment of consumer behaviour.

In cases where redistribution takes place, the fall in energy consumption can hardly be questioned. A reduction in the final demand for energy of almost 1.6% is observed. This is therefore mainly linked to changes in behaviour and it is less dependent on the impact of the measure on the level of activity.

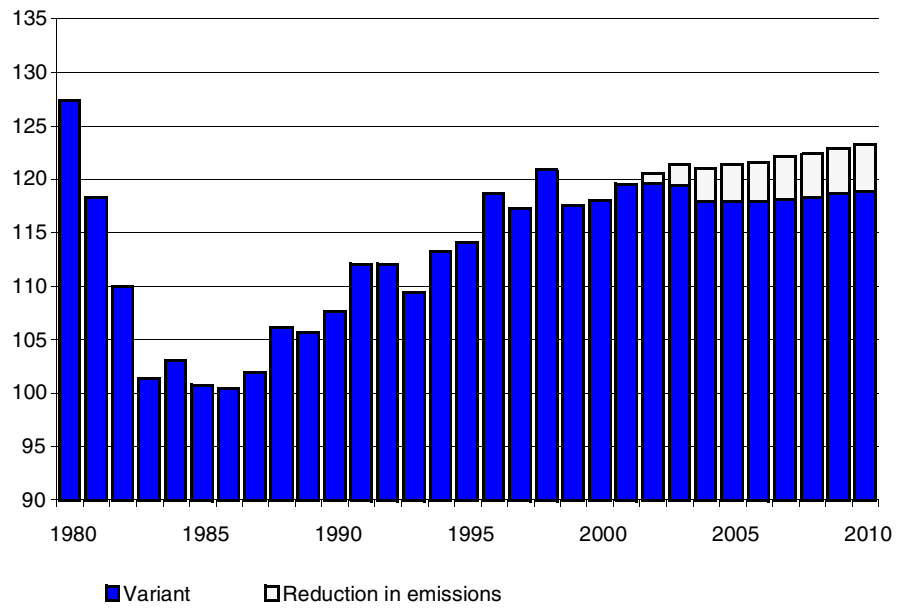
Emissions of CO₂ linked to energy consumption are reduced by 3.6% at the end of the period in the scenario without redistribution. Greater than average falls are seen in the power generation sector (decrease in electricity consumption) and transport (reduced consumption by the sector with fiscal penalisation of the most polluting products). On the other hand the reductions in emissions are lower for the residential and tertiary sectors and for industry.

TABLE 13 - Results relative to energy consumption and CO₂ emissions
(differences in % in relation to the base simulation)

	Alignment of energy taxation			Alignment of taxation + reduction in social security contributions		
	2002	2005	2010	2002	2005	2010
Final energy consumption						
- Total	-0.43	-1.44	-1.64	-0.41	-1.35	-1.55
- Industry	0.00	-0.25	-1.14	0.00	-0.26	-1.17
- Transport	-0.61	-1.93	-1.90	-0.62	-1.93	-1.91
- Residential and tertiary	-0.70	-2.13	-1.85	-0.65	-1.88	-1.58
CO ₂ emissions						
- Total	-0.72	-2.81	-3.58	-0.69	-2.66	-3.41
- Energy production	-0.91	-3.38	-4.54	-0.85	-2.98	-4.13
- Industry	0.29	0.34	-0.54	0.28	0.27	-0.64
- Transport	-1.61	-6.30	-7.34	-1.62	-6.30	-7.34
- Residential and tertiary	-0.75	-1.88	-1.05	-0.70	-1.62	-0.75

Taking into account the level of CO₂ emissions seen in the reference scenario, a simple alignment of the taxes on energy products at the average levels prevailing in our neighbouring countries will not allow us to achieve the objectives in terms of reducing emissions determined in the context of the Kyoto Protocol. The simulation of the model integrating the measure in fact suggests that a reduction in CO₂ emissions of the order of 4.4 million tonnes will be achieved. At the end of the period, CO₂ emissions will therefore still be at a level significantly higher than the objective set out in the Protocol.

FIGURE 3 - Evolution of energy-related CO₂ emissions
(millions of tonnes)





Introduction of a generalised CO₂ tax

A. Methods used in the variants

1. Introduction of a CO₂ tax according to two different methods

Two different methods have been adopted in order to calculate the CO₂ tax¹ which has been entered in the base simulation: the 'Draft National Climate Plan' method and the 'Tariff according to emissions trade' method.

a. 'Draft National Climate Plan' method

In this first exercise, a CO₂ tax is introduced which, once it is up to speed, amounts to EUR 11.5 per tonne of CO₂ (at 1990 prices). This level of taxation corresponds to the CO₂ tax proposal set out in the draft National Climate Plan.

The tax is introduced gradually, over the period from 2002 to 2010. Hence it only amounts to EUR 1.3 in the first year and it rises by the same amount each year to reach a maximum of EUR 11.5 (at 1990 prices) in 2010.

Table 14 shows a measure of the impact of the CO₂ tax on the prices of various energy products. The price increases diverge quite significantly, depending on the level of initial prices excluding tax, the initial level of taxation and the CO₂ content of the energy products. The impact is very high for solid fuels (coke and coal), much lower for heating fuel oil and natural gas and lower still for liquid fuels (since the price of these includes a significant amount of excise duty).

Overall the average price of energy (paid by the final consumer, taking all categories put together) would be increased by 7.4% in 2010.

Ex ante (i.e. before taking into account the effects of the tax on energy consumption), the introduction of the CO₂ tax would give rise to an increase in revenue (excluding VAT) of the order of EUR 2.2 billion per full year (which is equivalent to 0.6% of GDP). Table 15 shows how this additional revenue is distributed between the sectors involved. In total, *ex ante*, the tax paid by households (on heating, lighting and the proportion of transport attributable to them) would be

1. For the purpose of calculating this tax, only CO₂ emissions from an energy-related origin are included.

increased by 550 EUR million, while firms as a whole (including the energy sector) would see an increase in tax of EUR 1.66 billion.

b. 'Tariff according to emissions trade' method

This second method calculates the level of the CO₂ tax on the basis of a study carried out for the European Commission¹. This study postulates that an efficient system of emissions permits should be put in place in Europe (but not in the rest of the world). In this permits market, balancing would take place between the marginal costs of reducing emissions (for all sectors within the EU) and the price of the permit. The total cost of the system would be minimised. The base scenario in this study does not, however, take into account the voluntary agreement between the Commission and the European Automobile Manufacturers Association (ACEA), which is intended to reduce emissions from new vehicles.

Our second method for a CO₂ tax supposes that its level is equal to the marginal cost of reducing emissions calculated in the study for the European Commission. In this context the tax would reach a maximum of EUR(99) 31.6/tonne of CO₂, or EUR(90) 26.2/tonne of CO₂. As in the first method, this tax would be introduced gradually between 2002 and 2010.

The impact of this CO₂ tax on the price of energy products will once again depend upon the initial level of those products, the initial level of taxation and the CO₂ content of the products. The impact is once again very significant for solid fuels and, conversely, relatively low for liquid fuels (see Table 14). Overall the average price of energy would be increased by 16.3%, which is more than twice the impact calculated using the first variant.

TABLE 14 - Impact of the CO₂ tax on the prices of energy products
(differences in % in relation to the base simulation, in 2010)

	'Climate Plan' scenario	'Emissions trading equivalent' scenario
Solid fuels - industry	57.2	131.5
Solid fuels - households	54.1	124.6
Liquid fuels		
- Petrol	4.4	10.1
- Diesel	6.6	15.1
- Heating oil	10.7	24.5
- Heavy fuel oil	7.8	18.0
Gaseous fuels		
- Natural gas (small-scale consumers)	7.6	17.4
- Natural gas (small-scale consumers)	15.5	35.7
Average price of energy	7.4	16.3

1. Capros, P., Kouvaritakis, N., Mantzos, L: *Economic evaluation of sectoral emission reduction objectives for climate change: top-down analysis of Greenhouse gas emission reduction possibilities in the EU*, National Technical University of Athens, May 2000.

The new indirect revenue also rises significantly, since the CO₂ tax, in the 'Tariff according to emissions trade' version, makes it possible to collect, *ex ante*, more than EUR 4.8 billion in extra taxes, which is equivalent to 1.2% of GDP.

TABLE 15 - Revenue from the CO₂ tax
(EUR billions, in 2010)

	'Climate Plan' scenario	'Emissions trading equivalent' scenario
Industry, of which	499	1057
- Intermediate goods	325	682
- Equipment goods	19	42
- Consumption goods	138	295
Energy production sector	443	990
Private and public services	255	566
Households (heating, lighting)	344	743
Transport	577	1293
Miscellaneous	91	208
Total	2209	4858
in % of GDP	0.6	1.2

2. Reduction of certain compulsory withholding taxes

The other two variants make provision, in parallel with the introduction of the CO₂ tax, for full redistribution of this additional tax in the form of a reduction in other taxes. This reduction would benefit firms and households on a pro-rata basis in accordance with the additional taxes that they would have to pay in the first two scenarios. By doing this there would be no alteration of the total burden of compulsory withholding taxes, thus following the recommendations of the draft European directives on CO₂/energy.

In concrete terms, the redistribution would take place via a reduction in employees' social security contributions (thus benefiting households) and also in employers' contributions (thus benefiting firms). Other redistribution methods are, of course, possible (for example a reduction in other tax forms or use of a proportion of the new revenue to finance Rational Energy Use campaigns, but they have not been considered within the framework of this paper.

The reduction in employers' social security contributions (EUR 1.66 billion *ex ante* in 2010 in the first scenario, EUR 3.66 billion in the second scenario) is obtained by reducing the sectoral contribution rates uniformly (the reduction amounts to 1.3 points in 2010, in the first scenario and 2.8 points in the second scenario). On average this leads to a reduction in the cost of labour of between 0.8% and 1.9%.

As regards employees' social security contributions, the reduction in these, *ex ante*, is equivalent to 0.23% of household disposable income in the first case and 0.49% in the second case. Of course the increase in household purchasing power

is far from reaching this level due to the direct taxation affecting household income (see the results).

B. The results

This section first describes the main macro-economic and sectoral effects of CO₂ levies (paragraph 1). The impacts on public finances are analysed in paragraph 2. Finally the impact of the levies on energy consumption and on CO₂ emissions are discussed in paragraph 3. Each paragraph first describes the situation without redistribution of the tax revenue (point a) and then with redistribution (point b).

For the sake of comparability, each table contains results for both the 'National Climate Plan' version and for the 'Tariff according to emissions trade' version. The number of proposed years is therefore limited to three, namely 2002 (the first year), 2006 and 2012 (the last year of the simulation).

The tables in Chapter VIII show more intervening years, provide additional macro-economic information and also contain detailed results for each sector.

1. Macro-economic and sectoral effects

a. CO₂ levies without redistribution of the tax revenue

Macro-economic effects

Table 16 shows the main macro-economic effects of CO₂ levies. Tables 37 and 45 in Chapter VIII provide additional information. The economic impact of the CO₂ levy 'Tariff according to emissions trade' is of course greater than the levy according to the 'National Climate Plan'. In the last case the level of GDP in 2012 is 0.14% lower than in the base simulation, as compared with 0.31% in the 'Tariff according to emissions trade' version.

The negative impact on GDP is mainly due to the reduction in private consumption and investment by firms. Private consumption is discouraged by the adverse impact on purchasing power. This is because not all components of disposable income are indexed. Furthermore indexation takes place via the health index, which rises by less than the general level of consumer prices¹. Investment by firms is negatively impacted by the adverse effect on profitability and by less favourable sales prospects, not only on a domestic basis but also for exports. This is because higher (production) prices adversely affect competitiveness². The effect on GDP is softened to some extent by the reduced need for imports due to lower domestic demand. This largely concerns imports of energy.

The unfavourable consequences in terms of economic activity are also reflected in employment. In the first year the number of jobs lost in the 'National Climate Plan' version already exceeds 1000 units. In the long term the levy costs more than 11,000 jobs. In the 'tariff according to emissions trade' version almost 3,000 jobs

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1. The CO₂ levies are seen as an increase in excise duty, so that (at least with regard to petrol and diesel) they are kept outside the health index.
 2. That is because this scenario supposes only a CO₂ levy in Belgium.

disappear in the short term and more than 24,000 jobs in 2012, in comparison with the base simulation.

The current account balance is improved in comparison with the base simulation. In 2012 the surplus is 0.57% of GDP higher in the 'National Climate Plan' version and 1.20% in the 'Tariff according to emissions trade' version, which corresponds to an extra surplus of EUR 2.5 billion and EUR 5.4 billion respectively. The favourable impact is mainly due to a positive quantitative effect (the fall in imports is much larger than the loss of exports) and - to a lesser extent - to a positive impact on prices (improvement in the terms of trade).

Sectoral effects

Tables 38 and 46 in Chapter VIII show the sectoral effects of the two levels of taxation. Since both domestic and foreign demand are adversely affected, production in all industrial sectors is lower than in the base simulation. In the long term the loss of production amounts to between 0.26% (health care) and 1.76% (energy sector) if the case of the 'National Climate Plan' version of the CO₂ levy. In the 'Tariff according to emissions trade' version the loss of production in comparison with the base simulation is between 0.57% and 3.73%.

TABLE 16 - Key macro-economic impacts of CO₂ levies without redistribution of tax revenue
(differences in % in relation to the base simulation, unless otherwise stated)

	'National Climate Plan' version (11.5 EUR(90) per tonne of CO ₂)			'Tariff according to emissions trade' version (26.2 EUR(90) per tonne of CO ₂)		
	2002	2006	2012	2002	2006	2012
GDP (at constant prices)	-0.02	-0.12	-0.14	-0.05	-0.26	-0.31
- Private consumption	-0.05	-0.28	-0.49	-0.11	-0.63	-1.06
- Gross investment	-0.10	-0.79	-1.55	-0.22	-1.75	-3.20
- Exports	-0.01	-0.08	-0.14	-0.01	-0.18	-0.32
- Imports	-0.04	-0.30	-0.54	-0.09	-0.65	-1.15
Employment	-0.03	-0.15	-0.26	-0.07	-0.34	-0.56
Employment (in thousands)	-1.28	-6.24	-11.23	-2.94	-13.92	-24.28
Consumer prices	0.07	0.36	0.60	0.15	0.80	1.32
Health index	0.03	0.19	0.31	0.07	0.43	0.68
Households' real disposable income	-0.04	-0.29	-0.52	-0.10	-0.66	-1.13
Firms' gross operating surplus (in % of GDP)	-0.03	-0.14	-0.19	-0.07	-0.30	-0.42
Balance of current transactions with the rest of the world (in % of GDP)	0.04	0.29	0.57	0.10	0.63	1.20

b. CO₂ levies with redistribution of the tax revenue

The scenarios above simply come down to an increase in the burden on households and firms and therefore have an unfavourable impact on economic activity. In what follows we suppose that the proportion of the levy payable by households flows back to them in the form of a reduction in employees' social security contributions. Firms are compensated for the share that is paid by them through lower employers' contributions. The proceeds of the CO₂ levies are therefore all pumped back into the economy.

Macro-economic effects

Table 17 shows the main macro-economic effects of the CO₂ levies with redistribution of the tax revenue. Tables 41 and 49 in the statistical appendices provide further information.

The 'repayment' of the CO₂ tax revenue does, of course, soften the unfavourable economic consequences of the levy. GDP is now, in fact, slightly higher than in the base simulation, by 0.10% in the 'National Climate Plan' version and by 0.22% in the 'Tariff according to emissions trade' version. The redistribution cannot, however, prevent both domestic and foreign demand still being adversely affected, although to a lesser extent than in the pure taxation scenario. The fall in the demand for (energy) imports, however, gives rise to the positive effect on GDP.

The reduction in employees' social security contributions favours the growth in the household purchasing power, although their real disposable income is still rather lower than it is in the base simulation, due to an increase in direct taxation (because the reduction in employee's social security contributions increases taxable income, see also Table 20). In 2012 the loss of buying power amounts to 0.10% in the 'National Climate Plan' version and 0.19% in the 'Tariff according to emissions trade' version. The loss of private consumption is therefore also limited to 0.10% and 0.21% respectively. Investment by firms is also less severely affected due to the fall in the cost of wages and the attenuated decline in domestic and foreign demand. That is because the fall in the cost of wages compensates for part of the loss of competitiveness resulting from higher prices. The reduced effect on domestic demand also results in a less pronounced fall in imports.

Lower employers' social security contributions give rise to an increase in employment. In the 'National Climate Plan' version there are 9,500 more jobs in the long term than in the base simulation. In the 'Tariff according to emissions trade' version there are as many as 22,000 extra jobs. By comparison, in the situation without redistribution of tax revenue (see point a) 11,200 and 24,300 jobs were lost respectively.

The current account balance is still significantly improved in comparison with the base simulation, although less so than in the situation without redistribution of tax revenue, since import requirements are now reduced by less. In 2012 the surplus amounts to 0.43% of GDP higher in the 'National Climate Plan' version and 0.90% in the 'Tariff according to emissions trade' version, which corresponds to an extra surplus of EUR 1.9 billion and EUR 4 billion respectively. The positive quantitative effect (the fall in imports is much larger than the loss of exports) and the positive effect of prices (improved terms of trade) supplement each other.

TABLE 17 - Key macro-economic effects of CO₂ levies with redistribution of the tax revenue
(differences in % in relation to the base simulation, unless otherwise stated)

	'National Climate Plan' version (11.5 EUR(90) per tonne of CO ₂)			'Tariff according to emissions trade' version (26.2 EUR(90) per tonne of CO ₂)		
	2002	2006	2012	2002	2006	2012
GDP	-0.00	0.01	0.10	-0.01	0.03	0.22
- Private consumption	-0.02	-0.08	-0.10	-0.04	-0.18	-0.21
- Gross investment	-0.09	-0.66	-1.18	-0.20	-1.41	-2.37
- Exports	-0.00	-0.03	-0.05	-0.00	-0.07	-0.11
- Imports	-0.03	-0.23	-0.39	-0.07	-0.50	-0.82
Employment	0.00	0.08	0.22	0.00	0.19	0.51
Employment (in thousands)	0.05	3.42	9.47	0.10	7.90	21.76
Consumer prices	0.05	0.23	0.40	0.11	0.50	0.87
Health index	0.01	0.05	0.11	0.02	0.11	0.21
Households' real disposable income	-0.01	-0.08	-0.10	-0.03	-0.17	-0.19
Firms' gross operating surplus (in % of GDP)	0.01	0.01	-0.01	0.02	0.02	-0.02
Balance of current transactions with the rest of the world (in % of GDP)	0.03	0.22	0.43	0.07	0.47	0.90

Tables 42 and 50 in Chapter VIII demonstrate the sectoral effects of the two levels of taxation including redistribution of revenue. With the exception of the energy sector, the loss of production is now much less than in the situation where redistribution does not take place.

The positive impact on employment is also noticeable, again with the exception of the energy sector. This is because the reduction in employer's contributions gives rise to a fall in the cost of labour. It is only in the energy sector that this effect does not counterbalance the adverse effect on activity.

2. Impact on public finances

The consequences for public finances do, of course, depend on whether or not the tax revenue is redistributed, but they also depend on the impact of the levies on economic activity (indirect taxes and corporation tax), employment (direct taxes and unemployment benefits) and inflation (indexed expenditure). These are the so-called induced effects.

Table 18 shows the *ex ante* increase in tax revenues, i.e. without taking into account the induced effects of the measure on the economy. Budgetary receipts rise over time as a result of the gradual increase in the levy per tonne of CO₂ and the continuous increase in CO₂ emissions. In the 'National Climate Plan' version the government receives additional tax revenues in the first year of EUR 200 million in comparison with the base simulation. In 2012 the bonus amounts to EUR 2.35 billion. In the 'Tariff according to emissions trade' version the extra revenue rises from EUR 460 million in 2002 to EUR 4.87 billion in 2010 and EUR 5.16 billion in 2012.

TABLE 18 - Ex ante revenue from CO₂ levies for the government
(EUR billions)

	'National Climate Plan' version (11.5 EUR(90) per tonne of CO ₂)			'Tariff according to emissions trade' version (26.2 EUR(90) per tonne of CO ₂)		
	2002	2006	2012	2002	2006	2012
EUR billions	0.20	1.13	2.35	0.46	2.52	5.16

The *ex post* results for the government finances are obtained after simulation of the whole model. They are discussed below.

a. CO₂ levies without redistribution of the tax revenue

Without redistribution, in the 'National Climate Plan' version the government receives an increase in its balance of EUR 137 million in the first year and EUR 1.84 billion in 2012 (see Table 19). In the 'Tariff according to emissions trade' version net lending increases by 312 million in 2002 and 4 billion in 2012. These *ex post* amounts are significantly lower than the *ex ante* estimates in Table 18. The main causes are:

- the effect of the measure in terms of discouraging energy consumption (Table 22). As a result of this revenue from excise duty increases less rapidly than expected *ex ante* (in 2012: EUR 2.17 billion extra in the 'National Climate Plan' version and EUR 4.75 billion extra in the 'Tariff according to emissions trade' version). The difference is only partly compensated for by extra VAT revenue. In this category the negative quantitative effect (fall in private consumption at constant prices) is outweighed by the effect of price increases.
- revenue from direct taxation falls as a result of the negative effects of the CO₂ levies on economic activity and employment.
- the increase in government consumption (price effect) and transfers to households (price effect and more people receiving unemployment benefits).

Interest payments are the only significant item of expenditure which undergoes a favourable change due to the increased net lending (accelerated repayment of debt). This takes place in the long term, however, since initially it is still outweighed by the effect of the increase in nominal interest rates¹.

1. In all variants the hypothesis of constant real interest rates applies, so that higher inflation is fully reflected in nominal yields.

TABLE 19 - Budgetary effects of CO₂ levies without redistribution of tax revenue
(differences in EUR millions in relation to the base simulation)

	'National Climate Plan' version (11.5 EUR(90) per tonne of CO ₂)			'Tariff according to emissions trade' version (26.2 EUR(90) per tonne of CO ₂)		
	2002	2006	2012	2002	2006	2012
Current revenue, of which	192	1034	2136	433	2303	4694
- Direct taxation	-5	-77	-173	-13	-175	-377
- Indirect taxation	196	1085	2272	445	2422	4988
of which excise duty	191	1043	2166	433	2330	4751
- Social security contributions	-0	19	21	-1	41	49
Current expenditure, of which	54	327	288	122	729	595
- Government consumption	19	165	379	43	369	826
- Transfers to households ^a	21	131	265	47	291	575
- Interest payments	9	-2	-423	20	-4	-953
Balance of current revenue and expenditure	137	706	1848	311	1575	4099
Balance of capital revenue and expenditure	0	-1	-10	0	-1	-22
Net lending	137	706	1838	312	1573	4077

a. excl. transfers in kind.

b. CO₂ levies with redistribution of the tax revenue

Even if the tax revenue is redistributed, the impact on public finances is still positive (see Table 20). Initially the improvement in the government balance is minimal, but gradually the difference as compared with the base simulation grows larger. In the 'National Climate Plan' version the improvement in net lending is EUR 265 million in 2012. In the 'Tariff according to emissions trade' version this rises to almost EUR 600 million.

It is observed that the redistribution or non-redistribution of the tax revenue has a corresponding impact on energy consumption (Table 23 as compared with Table 22). As a result the impact on excise duty is comparable to the situation without redistribution. Nevertheless the overall revenue from indirect taxation is higher because private consumption is less affected in the case of redistribution.

Direct taxation is increased due to the creation of jobs. Revenue from social security contributions does fall, since the redistribution takes place through this channel. The ultimate loss of social security benefits is limited to some extent by job creation and through the increase in inflation.

Overall the current revenue in 2012 increases by EUR 568 million as compared with the base simulation in the 'National Climate Plan' version and by almost 1.23 billion in the 'Tariff according to emissions trade' version.

The final effect on the public balance is attenuated significantly by the increase in government expenditure. Government consumption rises as a result of inflation, although the effect is significantly smaller than the (even more inflationary) situation without redistribution. Transfers to households hardly increase at all.

The price effect, which leads to an increase in benefits, seems to be slightly stronger than the impact of the fall in the number of people receiving benefits. Interest payments also increase to some extent. The effect of higher nominal interest rates (because the real interest rate is kept constant) continues to outweigh the favourable effect of increased net lending (accelerated repayment of debt).

TABLE 20 - Budgetary effects of CO₂ levies with redistribution of tax revenue
(differences in EUR millions in relation to the base simulation)

	'National Climate Plan' version (11.5 EUR(90) per tonne of CO ₂)			'Tariff according to emissions trade' version (26.2 EUR(90) per tonne of CO ₂)		
	2002	2006	2012	2002	2006	2012
Current revenue, of which	30	188	568	66	409	1226
- Direct taxation	27	123	322	61	275	714
- Indirect taxation	196	1086	2301	444	2422	5038
of which excise duty	191	1044	2165	434	2327	4738
- Social security contributions	-193	-1026	-2065	-440	-2297	-4548
Current expenditure, of which	27	170	300	61	364	620
- Government consumption	9	76	198	21	165	418
- Transfers to households ^a	5	9	6	11	14	-7
- Interest payments	10	66	55	22	143	120
Balance of current revenue and expenditure	3	18	269	5	45	606
Balance of capital revenue and expenditure	1	3	-4	2	7	-9
Net lending	4	21	265	8	52	597

a. excl. transfers in kind.

Note on the budgetary results

This study presupposes that the private sector is only subject to a CO₂ tax. In order to comply with the Kyoto Protocol the government would then be responsible for purchasing the remaining emissions rights in a possible European or international emissions rights market. The purchase of these emissions rights will increase current expenditure and reduce the positive effect on net lending. It must be stressed that the future actual price of emissions rights is unknown and difficult to predict, certainly for as long as the ultimate participants in the Kyoto Protocol and the methods used remain unknown.

Sectoral challenges

It is useful to pay more attention to analysing the sectoral challenges involved in the different variants including redistribution. Since the reduction in the rate of contributions is proportional, it favours more labour-intensive sectors and those for which the implicit rates are highest.

In this way the bill due to the fossil energy tax can be compared with the amount 'redistributed' in the form of a reduction in social security contributions. Although it is understood that the two levels are balanced *ex ante* at the aggregated level, this is no longer the case *ex post* (taking into account job creation and the acceleration in the rise in wages). Furthermore, major differences appear at the sectoral level, as is shown by Table 21. Hence it is found that certain sectors benefit (very significantly in some cases) from the exchange (services, construction, equipment goods) while the operation tends to be costly for the intermediate goods, energy and transport sectors.

TABLE 21 - CO₂ levies with redistribution - by industrial sector, amounts paid and received
(EUR millions in 2012)

	'National Climate Plan' version (11.5 EUR(90) per tonne of CO ₂)			'Tariff according to emissions trade' version (26.2 EUR(90) per tonne of CO ₂)		
	CO ₂ levy paid	Reduction in contributions	Net burden	CO ₂ levy paid	Reduction in contributions	Net burden
Energy	469	74	395	1047	156	891
Intermediate goods	327	99	228	677	221	456
Equipment goods	19	99	-80	42	218	-176
Consumption goods	145	121	24	306	263	43
Construction	18	94	-76	41	206	-165
Transport	627	151	476	1683	335	1348
Other market services	205	791	-586	462	1740	-1278

3. Results in terms of energy consumption and CO₂ emissions

Energy consumption

In the scenarios that do not involve redistribution, the reduction in energy consumption induced by the tax is significant and plays an important part in the partial absorption of the shock. From the first year onwards, final energy consumption is 0.35% lower in the Climate Plan and 0.76% lower in the Emissions Permits version. In 2012, consumption falls by 3.77% and 7.50% respectively. In this case the choice of a sufficiently long simulation period makes it possible to take into account the delays in the adjustment of consumer behaviour.

In the redistribution scenario, the fall in energy consumption can hardly be called into question. A reduction in the final demand for energy of almost 3.7% in the Climate Plan option and 7.3% in the Emissions Permits option should be seen. The fall in the demand for energy is therefore linked primarily to changes in behaviour and is less dependent on the impact of the measure on the level of activity.

Tables 22 and 23 also describe the impact of the tax on the structure of energy consumption for both final consumers and the power generation sector. The largest falls in consumption occur in the case of solid fuels, followed by gaseous fuels and electricity. Solid fuels are handicapped both by a sharp rise in prices (because of the tax) and by a reduction in the demand for electricity (which is here expressed as a reduction in the amount of power generated by coal-fired power stations). The same phenomena have an impact, although to a lesser extent, in the case of derived gases. It will also be noted that the demand for liquid fuels falls relatively little (limited price effect in the transport sector).

CO₂ emissions

Emissions of CO₂ associated with energy consumption are reduced by 5.45% and 10% respectively by the end of the two scenarios including redistribution. Larger than average falls are seen in the power generation sector (decline in activity in power stations) and industry. It should be noted that CO₂ emissions from the power generation sector are reduced as a result of the following factors: reduction in the demand for electricity, giving rise to a fall in activity in this sector; increase in electricity imports (which give rise to an increase in competitiveness); reduction of the share of solid fuels (which are adversely affected by the tax). With

regard to this last factor (the change in the structure of production), this is corroborated by the results from the PRIMES model. On the other hand the smallest reductions in emissions are seen in the residential and tertiary sector and the transport sector.

TABLE 22 - Impact of the CO₂ tax without redistribution on energy consumption and on emissions of energy-related CO₂
(differences in % in relation to the base simulation)

	'National Climate Plan' version (11.5 EUR(90) per tonne of CO ₂)			'Tariff according to emissions trade' version (26.2 EUR(90) per tonne of CO ₂)		
	2002	2006	2012	2002	2006	2012
Final energy consumption						
- Total	-0.35	-1.86	-3.77	-0.76	-3.82	-7.50
- Industry	-0.57	-2.92	-6.62	-1.23	-5.68	-12.36
- Transport	-0.13	-0.66	-1.19	-0.28	-1.49	-2.76
- Residential and tertiary	-0.30	-1.73	-3.25	-0.64	-3.76	-6.86
Consumption by the power generation sector	0.12	-1.66	-6.24	0.26	-3.76	-11.71
Energy consumption by product ^a						
- Total	-0.28	-1.83	-4.18	-0.61	-3.81	-8.19
- Solid fuels	-1.38	-10.74	-32.63	-2.94	-19.54	-46.94
- Liquid fuels	0.02	-0.10	-0.56	0.06	-0.41	-1.68
- Gas	-0.45	-2.07	-3.63	-1.00	-4.79	-9.57
- Electricity	0.14	-0.07	-1.38	0.31	-0.36	-3.27
CO ₂ emissions						
- Total	-0.41	-2.48	-5.64	-0.88	-5.05	-10.43
- Energy production	0.05	-1.94	-7.34	0.09	-4.09	-12.15
- Industry	-1.03	-4.51	-9.20	-2.22	-8.62	-16.79
- Transport	-0.18	-1.16	-2.56	-0.40	-2.58	-5.57
- Residential and tertiary	-0.34	-2.07	-3.89	-0.73	-4.43	-7.95

a. both final energy consumption and consumption by the power generation sector.

TABLE 23 - Impact of the CO₂ tax with redistribution on energy consumption and on emissions of energy-related CO₂
(differences in % in relation to the base simulation)

	'National Climate Plan' version (11.5 EUR(90) per tonne of CO ₂)			'Tariff according to emissions trade' version (26.2 EUR(90) per tonne of CO ₂)		
	2002	2006	2012	2002	2006	2012
Final energy consumption						
- Total	-0.35	-1.83	-3.69	-0.75	-3.74	-7.30
- Industry	-0.57	-2.92	-6.62	-1.23	-5.65	-12.31
- Transport	-0.14	-0.69	-1.22	-0.30	-1.54	-2.80
- Residential and tertiary	-0.28	-1.62	-3.02	-0.60	-3.52	-6.37
Consumption by the power generation sector	0.14	-1.42	-5.76	0.31	-3.27	-10.74
Energy consumption by product ^a						
- Total	-0.28	-1.77	-4.04	-0.60	-3.67	-7.88
- Solid fuels	-1.36	-10.44	-31.63	-2.90	-18.86	-44.84
- Liquid fuels	0.03	-0.03	-0.44	0.09	-0.26	-1.42
- Gas	-0.45	-2.07	-3.62	-1.01	-4.79	-9.50
- Electricity	0.14	-0.01	-1.24	0.32	-0.24	-2.99
CO ₂ emissions						
- Total	-0.40	-2.40	-5.45	-0.86	-4.86	-10.00
- Energy production	0.06	-1.70	-6.81	0.14	-3.59	-11.06
- Industry	-1.03	-4.54	-9.28	-2.22	-8.64	-16.85
- Transport	-0.18	-1.16	-2.53	-0.41	-2.58	-5.47
- Residential and tertiary	-0.32	-1.94	-3.65	-0.68	-4.15	-7.42

a. both final energy consumption and consumption by the power generation sector.

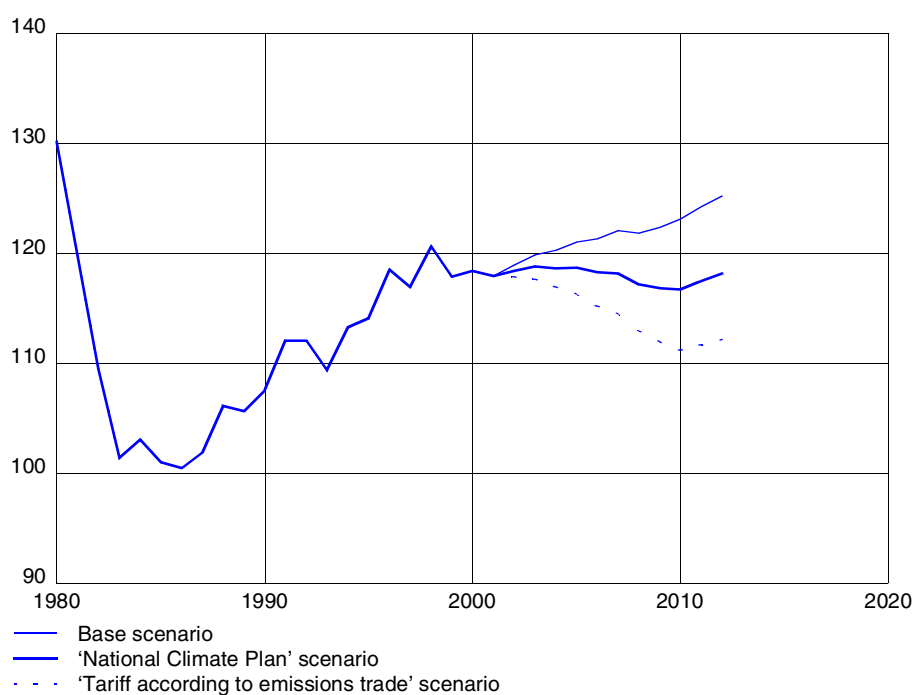
Taking into account the level of CO₂ emissions in the base simulation, the introduction of a CO₂ tax according to the two methods included here will make it possible to achieve significant reductions in emissions, while remaining a long way from the emissions reduction targets set within the context of the Kyoto Protocol. It should be remembered that in order to satisfy this Protocol Belgium has undertaken to reduce its emissions of greenhouse gases by 7.5% during the 2008-2012 period in relation to the level reached in 1990. If this rate of reduction is applied to CO₂, this means that Belgium must limit its CO₂ emissions to an average of 99.5 million tonnes during the period from 2008 to 2012. The simulation from the model based on the first version (Climate Plan) including redistribution suggests that a reduction in CO₂ emissions of 6.8 million tonnes is achieved. On average over the 2008-2012 period, CO₂ emissions would therefore reach 117.5 million tonnes, which is a much higher level than the target set out in the Protocol. As regards the second version including redistribution, this would make it possible to reduce CO₂ emissions by the equivalent of 12.5 million tonnes, thus bringing the average level of emissions over the 2008-2012 period to 112.4 million tonnes of CO₂. In this last case the result is therefore more substantial but only about 50% of the Kyoto target is reached (a further 12.9 million tonnes remains)¹.

1. We should remind that the versions used in the simulation are not supposed to have an impact on other greenhouse gases (or sources thereof).

TABLE 24 - Energy-related CO₂ emissions¹
(millions of tonnes)

	1990	2000	2002	2006	2012
Base simulation	107.7	118.4	118.9	121.3	125.2
'National Climate Plan' variant					
- without redistribution			118.4	118.3	118.2
- with redistribution			118.4	118.4	118.4
'Tariff according to emissions trade' variant					
- without redistribution			117.8	115.2	112.2
- with redistribution			117.9	115.4	112.7

1. The sectoral distribution of emissions in the base simulation is shown in Table 6. Taht of the variants can be found in the statistical appendix (Chapter VIII).

FIGURE 4 - Evolution of energy-related CO₂ emissions
(millions of tonnes)



Introduction of a CO₂ levy on road transport

A. Methods used in the different variants

1. Introduction of a CO₂ tax on fuels

In this last version, when the CO₂ tax is up to speed it amounts to EUR 20.3 per tonne of CO₂ (at 1990 prices). This tax would only be levied on liquid fuels and would be introduced very gradually over the period from 2002 to 2010. Hence it only amounts to EUR 0.007 in the first year and rises by the same amount each year to reach a maximum of EUR 0.067 in 2010 (in the case of petrol; in the case of diesel the additional tax would be EUR 0.062)¹.

Taking into account the current prices of liquid fuels and their development during the 2001-2012 forecast, the rise in prices of these fuels would be far from spectacular. By 2010, in comparison with the base simulation, the price of petrol would thus be increased by 6.1%, while the rise in the price of diesel would be 7.3%.

Ex ante, the introduction of a CO₂ tax on liquid fuels would result in an increase in energy revenue (excluding VAT) of the order of EUR 546 million per full year (which is equivalent to 0.14% of GDP). According to our calculations this amount would be shared approximately equally between households and firms.

2. Reduction of some compulsory withholding taxes

The first scenario involves, in parallel with the introduction of the CO₂ tax, complete redistribution of the additional tax in the form of reductions in other tax forms. This reduction would benefit firms and households on a pro-rata basis according to the tax increase that these actors would have to pay. In this way it would be possible to respect the principle of fiscal neutrality which is defended in the draft European directives on the CO₂/energy tax.

In concrete terms redistribution would take place via a reduction in personal social security contributions (benefiting households) and employer's contribu-

1. As a reminder, the excise duty currently imposed on liquid fuels amounts to EUR 0.51 for petrol and EUR 0.29 for diesel.

tions (benefiting firms). The reduction in employers' social security contributions (EUR 285 million *ex ante* in 2010) is obtained by reducing the sectoral contribution rate by a uniform amount (the reduction amounts to 0.23 percentage points in 2010).

As regards employees' social security contributions, the reduction in these *ex ante* would amount to EUR 261 million in 2010, which is equivalent to 0.11% of household disposable income. Of course the increase in household purchasing power would be far short of this level, due to the direct taxation affecting their income (see the results).

3. Increase in investments in transport

A second scenario has been tested. This supposes that part of the revenue from the CO₂ tax is immediately injected back into the transport sector. In concrete terms this second scenario would devote 40% of the new revenue to financing investment projects in public transport. The remainder of the additional tax revenue (60% of EUR 546 million) would be devoted, as previously, to a reduction in employers' and employees' social security contributions, according to the methods described above.

4. Other hypotheses

The other hypotheses incorporated in the base simulation remain unchanged, in particular the international environment and the other hypotheses in relation to domestic policy (non-energy taxation, hypotheses in relation to the labour market etc.).

B. Results

The next three points cover the presentation of the results. In the first we will comment on the main macro-economic and sectoral results. The second point concerns the results in relation to public finances. The last point considers the effects on energy consumption and CO₂ emissions. More detailed results are presented in Chapter IX.

1. Macro-economic and sectoral results

Table 25 shows the effects of the two scenarios on GDP and its components, employment, costs and prices and on the current account. The impact is stated for 2002 (the first year of the simulation), 2006 and 2012 (the last year of the simulation).

TABLE 25 - Principal macro-economic results of the variants
(differences in % in relation to the base simulation)

	Scenario I: increase in taxation and reduction in social security contributions			Scenario II: increase in taxation, reduction in social security contributions and increase in investments		
	2002	2006	2012	2002	2006	2012
GDP	-0.00	0.01	0.04	0.00	0.02	0.05
- Private consumption	-0.01	-0.05	-0.08	-0.01	-0.07	-0.11
- Gross investment	-0.02	-0.03	0.06	0.03	0.14	0.29
- Exports	-0.00	-0.00	-0.01	-0.00	-0.01	-0.01
- Imports	-0.01	-0.05	-0.06	-0.01	-0.03	-0.03
Employment	0.00	0.01	0.04	-0.00	0.01	0.03
Employment (in thousands)	0.00	0.52	1.86	-0.01	0.29	1.16
Consumer prices	0.03	0.12	0.20	0.03	0.13	0.22
Health index	0.00	0.00	0.01	0.00	0.01	0.03
Households' real disposable income	-0.01	-0.05	-0.08	-0.01	-0.07	-0.11
Firms' gross operating surplus (in % of GDP)	0.00	0.00	0.00	-0.00	-0.01	-0.01
Balance of current transactions with the rest of the world (in % of GDP)	0.01	0.04	0.05	0.00	0.02	0.02

a. Scenario I: variant with full redistribution in the form of reductions in social security contributions

Overall this first variant has little effect on GDP, since the full redistribution of revenue from the CO₂ tax counterbalances its negative effects.

In the medium term GDP will rise slightly due to the positive effects linked to the reduction in the wage cost and the partial expansion of household purchasing power. In total the volume of GDP will rise by 0.01% in 2006 and 0.04% in 2012.

This slight increase will take place in the context of a slight reduction in domestic demand, which is accounted for by a slight fall in private consumption (due to a fall in income in real terms)¹. In parallel with this an increase in the contribution of net exports towards growth will be observed, which can be accounted for by the reduction in imports (a large proportion of which is energy).

The effects on employment are also slightly positive: the reduction in social security labour costs will, in particular, make it possible to limit the negative effects associated with the introduction of the CO₂ tax. Domestic employment will rise by 520 units in 2006 and, in 2012, a rise in 1900 jobs will be seen in relation to the base simulation.

1. The fall in household income in real terms is largely due to the use of the health index for indexation of salaries and social security benefits. In the simulated scenario the increase in indirect taxation affecting liquid fuel will not have any impact on this index. This will result in a loss of buying power.

The current account balance will be improved in relation to the base simulation. A rise in the surplus will be seen of EUR 22 million in 2002 and 126 million in 2006. In the medium term the surplus will be EUR 233 million higher (see Table 53 in Chapter IX). The improvement is essentially due to the fall in imports, which is in turn accounted for by the - slight - reduction in domestic demand and the reduction in energy consumption.

Table 54 in Chapter IX shows the sectoral effects of scenario I. With the exception of the energy sector, the variant barely has any impact on production by the various industrial sectors. The loss of activity in the energy sector adversely affects employment in that sector. The other industrial sectors demonstrate a positive effect on employment thanks to the lower burden of tax on labour.

b. Scenario II: the tax revenue partly finances reductions in contributions (60%) and partly finances investments in public transport (40%)

The macro-economic results of this scenario do not differ much from the first variant. In the medium term GDP will be 0.05% higher than in the base simulation (as compared with 0.04% in scenario I).

The impact on private consumption is more negative (-0.11% in the medium term) due to the greater loss of purchasing power. This is because less money is used to reduce employee's social security contributions. The largest differences occur in the area of investment, which is 0.29% higher in the medium term than in the base simulation (as compared with 0.06% in scenario 1). Domestic demand undergoes a very slight increase of 0.02% in 2012 as a result (as compared with a reduction of 0.02% in scenario I, see tables 53 and 57 in Chapter IX). Stronger domestic demand also results in a less pronounced fall in demand for imports.

The current account balance still improves in comparison with the base simulation, albeit less strongly than in scenario I because the demand for imports are now reduced by less. In 2012 the surplus is EUR 120 million higher, i.e. 0.02% of GDP.

In the long term scenario II generates some 1,200 extra jobs. The job creation effect is therefore less pronounced than in the first scenario. This is because the budget for the reduction in employers' contributions (and thus the cost of labour) is lower. The additional investments in the HERMES 'Transport and Communication' sector will, however, provide some compensation. We assume that this will include both construction works (non-residential building and infrastructure works) and transport, with the construction sector and the investment goods sector being involved respectively¹. Of the 1,200 new jobs the - labour-intensive - construction sector accounts for more than 500², while employment in the investment goods sector rises by only about one hundred units.

-
1. On the basis of data from the input-output team in connection with the composition of the investments in rail transport, we assume that the two 'suppliers' each account for approximately half the investments at constant prices and we have also adjusted the import-intensity of the investment package.
 2. In scenario 1 the figure is only 300 out of the 1,900 new jobs.

It should be pointed out that since the 'Transport and communication' sector has not been further disaggregated in the HERMES model, we cannot take into account possible substitution effects between public and private transport (which can mainly be caused by a change in relative prices between the two categories).

2. Impact on public finances

a. Scenario I

Taking into account the full redistribution of the revenue from the CO₂ tax, government net lending is only slightly changed in relation to the base simulation.

The growth in revenue is dominated by two movements in opposite directions: the increase in indirect taxation which is mainly due to the new CO₂ tax and the fall in social security contributions. This fall largely compensates for the increase in indirect taxation induced by the new tax. The higher total revenue therefore mostly comes from an increase in direct taxation which is itself largely due to higher taxable income (thanks to the reduction in employee's social security contributions).

The clear increase in revenues is partly offset by a parallel increase in public expenditure. Hence an increase in public consumption is seen (rise in the price of goods and services consumed by public authorities) and transfers to other economic actors (rise in various price indices). A slight rise is also observed in interest payments resulting from the rise in nominal interest rates. In total, current public expenditure increases by EUR 11 million in 2002, 64 million in 2006 and 115 million in 2012.

Taking these various movements into account, the financing capacity of the government as a whole is raised by EUR 107 million at the end of the period.

b. Scenario II

In contrast to scenario I, the second variant results in a slight shrinkage in the government balance. The difference between this and the government balance in the basis simulation is never, however, more than EUR 23 million. In the long term there is hardly any difference at all (-5 million).

As regards current revenue, there is a smaller fall in social security benefits (-300 million in the medium term as compared with -520 million in scenario I). This does not, however, mean that the balance of current transactions is improved to the same extent (+228 million or only EUR 117 million more than in scenario I).

There are several reasons for this. The extra revenue from direct taxes amount to only EUR 63 million (as compared with EUR 107 million in scenario I) as a result of the more limited fall in employees' social security contributions and reduced job creation. Current expenditure also rises more rapidly. The slightly greater price

effect in scenario II gives rise to extra government consumption and transfers. This price effect is also reflected in higher nominal interest rates, which, together with the slight deterioration in the government balance, results in extra interest payments.

As regards capital transactions, financing of additional investments in public transport is translated into a decline in this amount by EUR 230 million.

TABLE 26 - Impact of the scenarios on public finances
(differences in EUR millions in relation to the base simulation)

	Scenario I: increase in taxation and reduction in social security contributions			Scenario II: increase in taxation, reduction in social security contributions and increase in investments		
	2002	2006	2012	2002	2006	2012
Current revenue, of which	16	79	225	37	182	404
- Direct taxation	12	42	107	10	28	63
- Indirect taxation	57	307	634	58	309	634
of which excise duty	55	287	570	55	287	570
- Social security contributions	-53	-272	-520	-31	-157	-299
Current expenditure, of which	11	64	115	13	91	176
- Government consumption	3	29	80	4	37	96
- Transfers to households	2	4	8	3	11	22
- Transfers to firms	1	4	8	1	5	9
- Interest payments	5	25	13	4	35	43
Balance of current revenue and expenditure	5	15	111	25	91	228
Balance of capital revenue and expenditure	0	1	-4	-22	-114	-232
Net lending	5	17	107	3	-23	-5

3. Results in relation to energy consumption and CO₂ emissions

In the scenario including full redistribution in the form of a reduction in social security contributions, the reduction in energy consumption caused by the tax contributes towards the partial absorption of the shock. Although in the first year the ultimate amount of energy consumed falls by only 0.04%, in the medium term consumption falls by 0.28%. In this case the choice of a sufficiently long simulation period makes it possible to take into account delays in adjustment of consumers' behaviour. The reduction in consumption takes place mainly in transport, and is more limited in other sectors.

CO₂ emissions linked to energy consumption are reduced by 0.9% at the end of the period in relation to the base simulation. The reductions in emissions are concentrated in the transport sector, but slight falls can also be noted in the other sectors.

As regards the results obtained in scenario II, these are very close to the results in scenario I: reduction of energy consumption of 0.28% in the medium term and a fall in CO₂ emissions of 0.9%.

TABLE 27 - Impact on energy consumption and CO₂ emissions of the two scenarios
(differences in % in relation to the base simulation)

	Scenario I: increase in taxation and reduction in social security contributions			Scenario II: increase in taxation, reduction in social security contributions and increase in investments		
	2002	2006	2012	2002	2006	2012
Final energy consumption						
- Total	-0.04	-0.17	-0.28	-0.04	-0.17	-0.28
- Industry	-0.00	-0.02	-0.04	-0.00	-0.02	-0.03
- Transport	-0.12	-0.56	-0.91	-0.12	-0.56	-0.90
- Residential and tertiary	-0.01	-0.03	-0.02	-0.01	-0.04	-0.03
CO ₂ emissions						
- Total	-0.07	-0.44	-0.90	-0.07	-0.44	-0.90
- Energy production	0.02	0.04	0.01	0.02	0.03	-0.01
- Industry	0.00	-0.03	-0.05	0.00	-0.02	-0.03
- Transport	-0.33	-1.85	-3.48	-0.33	-1.84	-3.47
- Residential and tertiary	-0.03	-0.08	-0.10	-0.03	-0.09	-0.11

Taking into account the level of CO₂ emissions in the base simulation, the introduction of a CO₂ tax only affecting the transport sector makes it possible to achieve only rather limited reductions in emissions¹, of the order of 1.1 million tonnes of CO₂.

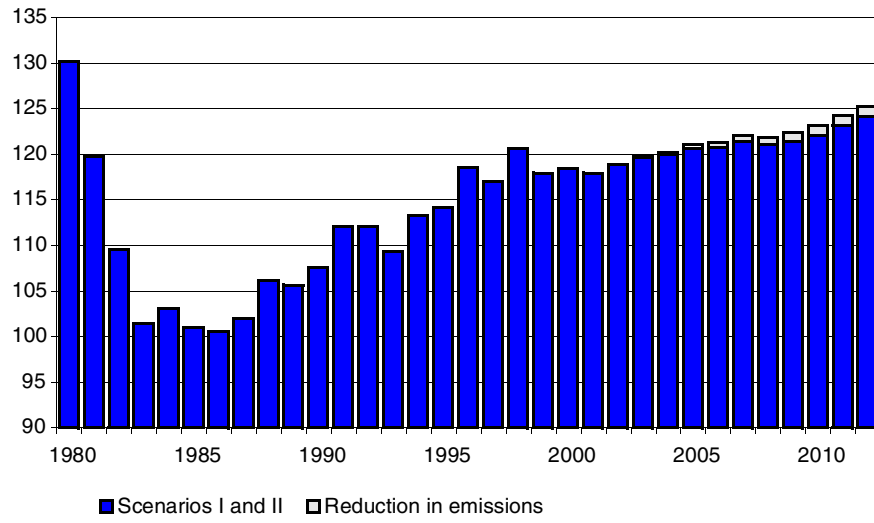
This leaves us a long way again from the emissions reduction targets set in the context of the Kyoto Protocol (namely a reduction by 2012 of more than 25 million tonnes of CO₂).

TABLE 28 - CO₂ emissions
(millions of tonnes)

	1990	2000	2002	2006	2012
Base simulation	107.6	118.4	118.9	121.3	125.2
Scenario I			118.8	120.8	124.1
Scenario II			118.8	120.8	124.1

1. It should be noted that taking other greenhouse gases into account only slightly alters our conclusion: the total reduction in emissions of greenhouse gases will be slightly higher than the figure calculated for energy-related CO₂ alone (1.16 million tonnes of CO₂ equivalent in scenario I, as compared with 1.10 million tonnes related to energy-related CO₂ alone).

FIGURE 5 - Evolution of energy-related CO₂ emissions
(millions of tonnes)





Detailed results of Chapter IV

A. Detailed results of the first variant: alignment of energy taxation

TABLE 29 - Main macro-economic results
(differences in % in relation to the base simulation, unless otherwise indicated)

	2002	2003	2004	2005	2007	2010
GDP and its components						
- Private consumption	-0.22	-0.52	-0.78	-0.83	-0.78	-0.73
- Gross fixed capital formation	-0.33	-0.68	-1.01	-1.01	-0.93	-0.76
. Firms	-0.44	-0.90	-1.34	-1.38	-1.37	-1.29
- Total domestic demand	-0.22	-0.47	-0.69	-0.71	-0.66	-0.59
- Exports	-0.02	-0.07	-0.11	-0.14	-0.13	-0.11
- Imports	-0.13	-0.30	-0.46	-0.50	-0.50	-0.46
- GDP	-0.11	-0.23	-0.33	-0.33	-0.27	-0.19
Prices and costs						
- Consumption prices	0.32	0.62	0.91	0.91	0.85	0.70
- Health index	0.08	0.17	0.25	0.27	0.24	0.14
- GDP deflator	0.23	0.45	0.66	0.67	0.62	0.49
- Real hourly wage	-0.24	-0.45	-0.64	-0.61	-0.58	-0.54
- Unit labour cost	0.16	0.32	0.47	0.47	0.40	0.23
Employment						
- Differences in %	-0.12	-0.25	-0.36	-0.35	-0.32	-0.28
- Differences in thousands	-4.90	-9.99	-14.61	-14.48	-13.29	-12.08
- Labour productivity/hour	-0.09	-0.18	-0.25	-0.23	-0.18	-0.12
Income						
- Households' real disposable income	-0.22	-0.56	-0.84	-0.90	-0.81	-0.74
- Households' saving rate (differences in level)	0.0	-0.03	-0.05	-0.06	-0.02	-0.01
- Firms' gross operating surplus	-0.14	-0.26	-0.37	-0.35	-0.34	-0.29
Balance of current transactions with the rest of the world						
- Differences in EUR billions	0.31	0.70	1.11	1.22	1.38	1.54
- Differences in % of GDP	0.11	0.23	0.35	0.37	0.38	0.38

TABLE 30 - Main sectoral results
(differences in % in relation to the base simulation)

	2002	2003	2004	2005	2007	2010
Output						
- Agriculture	-0.13	-0.26	-0.36	-0.34	-0.29	-0.26
- Energy	-0.70	-1.35	-1.92	-1.88	-1.84	-1.79
- Manufacturing	-0.17	-0.36	-0.52	-0.51	-0.46	-0.41
. Intermediate goods	-0.10	-0.25	-0.40	-0.44	-0.41	-0.37
. Equipment goods	-0.38	-0.73	-1.00	-0.93	-0.82	-0.74
. Consumption goods	-0.11	-0.22	-0.31	-0.28	-0.24	-0.21
- Construction	-0.31	-0.61	-0.85	-0.78	-0.61	-0.47
- Transports and communication	-0.20	-0.41	-0.58	-0.55	-0.45	-0.38
- Retail, hotel and catering	-0.27	-0.58	-0.86	-0.89	-0.81	-0.74
- Credit and insurance	-0.15	-0.36	-0.57	-0.63	-0.63	-0.62
- Health care	-0.10	-0.12	-0.15	-0.09	-0.10	-0.13
- Other market services	-0.28	-0.54	-0.76	-0.72	-0.64	-0.57
Employment						
- Agriculture	-0.00	-0.01	-0.01	-0.01	-0.02	-0.01
- Energy	-0.35	-0.85	-1.39	-1.69	-2.15	-2.54
- Manufacturing	-0.05	-0.11	-0.14	-0.11	-0.02	-0.01
. Intermediate goods	-0.00	0.02	0.08	0.17	0.31	0.35
. Equipment goods	-0.10	-0.24	-0.38	-0.41	-0.35	-0.30
. Consumption goods	-0.06	-0.12	-0.15	-0.11	-0.03	-0.05
- Construction	-0.30	-0.59	-0.85	-0.80	-0.63	-0.48
- Transports and communication	-0.13	-0.29	-0.42	-0.42	-0.39	-0.36
- Retail, hotel and catering	-0.14	-0.30	-0.45	-0.49	-0.51	-0.53
- Credit and insurance	-0.08	-0.18	-0.29	-0.33	-0.36	-0.37
- Health care	-0.06	-0.06	-0.07	-0.02	-0.03	-0.03
- Other market services	-0.25	-0.49	-0.68	-0.64	-0.53	-0.45

TABLE 31 - Results for public finances
(differences in EUR millions in relation to the base simulation, unless otherwise indicated)

	2002	2003	2004	2005	2007	2010
Revenue	550	1072	1594	1591	1612	1598
- Direct taxation	-41	-92	-143	-140	-119	-135
- Indirect taxation	597	1178	1750	1745	1762	1814
of which excise duty	577	1145	1701	1695	1704	1760
- Social security contributions	-10	-20	-24	-25	-42	-91
Expenditure	210	468	663	629	420	61
- Government consumption	42	118	199	242	245	207
- Social security transfers	93	193	294	307	299	254
- Interest payments	75	157	170	81	-124	-400
Balance of current revenue and expenditure	340	604	931	962	1192	1537
Balance of capital revenue and expenditure	-6	-12	-18	-16	-15	-17
Net lending						
- In EUR millions	334	591	914	945	1177	1520
- In % of GDP	0.12	0.20	0.30	0.29	0.33	0.37

TABLE 32 - Results relative to energy consumption and CO₂ emissions
(differences in % in relation to the base simulation)

	2002	2003	2004	2005	2007	2010
Final energy consumption						
- Total	-0.43	-0.89	-1.34	-1.44	-1.57	-1.64
- Industry	0.00	-0.03	-0.11	-0.25	-0.99	-1.14
- Transport	-0.61	-1.23	-1.84	-1.93	-2.02	-1.90
- Residential and tertiary	-0.70	-1.42	-2.10	-2.13	-2.03	-1.85
CO ₂ emissions						
- Total	-0.72	-1.57	-2.48	-2.81	-3.23	-3.58
- Energy production	-0.91	-1.97	-3.04	-3.38	-3.89	-4.54
- Industry	0.29	0.45	0.55	0.34	-0.06	-0.54
- Transport	-1.61	-3.49	-5.54	-6.30	-7.10	-7.34
- Residential and tertiary	-0.75	-1.46	-2.04	-1.88	-1.49	-1.05

B. Detailed results of the second variant: alignment of energy taxation with redistribution

TABLE 33 - Main macro-economic results
(differences in % in relation to the base simulation, unless otherwise indicated)

	2002	2003	2004	2005	2007	2010
GDP and its components						
- Private consumption	-0.11	-0.28	-0.41	-0.43	-0.37	-0.32
- Gross fixed capital formation	-0.27	-0.54	-0.75	-0.70	-0.62	-0.43
. Firms	-0.36	-0.73	-1.06	-1.06	-1.06	-0.97
- Total domestic demand	-0.14	-0.29	-0.41	-0.39	-0.34	-0.27
- Exports	-0.01	-0.03	-0.04	-0.05	-0.05	-0.04
- Imports	-0.10	-0.23	-0.34	-0.35	-0.34	-0.30
- GDP	-0.05	-0.09	-0.11	-0.08	-0.03	0.02
Prices and costs						
- Consumption prices	0.27	0.51	0.73	0.70	0.66	0.57
- Health index	0.03	0.05	0.06	0.05	0.04	0.00
- GDP deflator	0.14	0.26	0.37	0.35	0.33	0.28
- Real hourly wage	-0.24	-0.47	-0.67	-0.66	-0.62	-0.58
- Unit labour cost	-0.15	-0.27	-0.38	-0.34	-0.28	-0.29
Employment						
- Differences in %	-0.04	-0.07	-0.07	-0.03	0.03	0.07
- Differences in thousands	-1.74	-2.83	-3.05	-1.27	1.32	2.96
- Labour productivity/hour	-0.12	-0.24	-0.35	-0.35	-0.34	-0.30
Income						
- Households' real disposable income	-0.09	-0.29	-0.43	-0.46	-0.36	-0.29
- Households' saving rate (differences in level)	0.02	-0.00	-0.01	-0.02	0.01	0.03
- Firms' gross operating surplus	-0.02	-0.05	-0.07	-0.08	-0.09	-0.08
Balance of current transactions with the rest of the world						
- Differences in EUR billions	0.20	0.47	0.75	0.82	0.94	1.02
- Differences in % of GDP	0.07	0.15	0.23	0.24	0.26	0.25

TABLE 34 - Main sectoral results
(differences in % in relation to the base simulation)

	2002	2003	2004	2005	2007	2010
Output						
- Agriculture	-0.06	-0.13	-0.18	-0.15	-0.13	-0.11
- Energy	-0.65	-1.25	-1.77	-1.72	-1.68	-1.60
- Manufacturing	-0.11	-0.21	-0.28	-0.25	-0.23	-0.20
. Intermediate goods	-0.08	-0.18	-0.26	-0.27	-0.24	-0.21
. Equipment goods	-0.28	-0.48	-0.63	-0.54	-0.49	-0.42
. Consumption goods	-0.03	-0.06	-0.07	-0.04	-0.02	-0.01
- Construction	-0.26	-0.46	-0.61	-0.49	-0.30	-0.08
- Transports and communication	-0.12	-0.25	-0.33	-0.28	-0.19	-0.12
- Retail, hotel and catering	-0.20	-0.40	-0.57	-0.56	-0.48	-0.41
- Credit and insurance	-0.10	-0.24	-0.37	-0.40	-0.38	-0.35
- Health care	-0.02	0.03	0.09	0.15	0.15	0.14
- Other market services	-0.21	-0.39	-0.53	-0.47	-0.38	-0.30
Employment						
- Agriculture	0.00	0.01	0.01	0.01	0.02	0.02
- Energy	-0.32	-0.76	-1.21	-1.44	-1.72	-2.11
- Manufacturing	-0.02	-0.01	0.03	0.12	0.30	0.38
. Intermediate goods	0.01	0.07	0.18	0.32	0.58	0.73
. Equipment goods	-0.07	-0.14	-0.19	-0.16	-0.02	0.14
. Consumption goods	-0.01	0.01	0.07	0.17	0.32	0.32
- Construction	-0.15	-0.27	-0.34	-0.25	-0.08	0.13
- Transports and communication	0.02	0.03	0.05	0.07	0.10	0.14
- Retail, hotel and catering	-0.07	-0.12	-0.16	-0.13	-0.09	-0.10
- Credit and insurance	0.04	0.06	0.08	0.07	0.05	0.03
- Health care	0.04	0.14	0.25	0.31	0.32	0.30
- Other market services	-0.11	-0.18	-0.20	-0.12	-0.03	0.03

TABLE 35 - Results for public finances
(differences in EUR millions in relation to the base simulation, unless otherwise indicated)

	2002	2003	2004	2005	2007	2010
Revenue	137	256	399	424	511	589
- Direct taxation	109	214	327	352	413	472
- Indirect taxation	607	1200	1784	1783	1808	1885
of which excise duty	580	1150	1709	1703	1711	1769
- Social security contributions	-583	-1162	-1720	-1719	-1719	-1776
Expenditure	143	306	417	385	299	164
- Government consumption	16	50	83	102	103	89
- Social security transfers	51	91	125	110	93	64
- Interest payments	76	166	209	172	102	11
Balance of current revenue and expenditure	-6	-50	-18	39	211	425
Balance of capital revenue and expenditure	-5	-10	-14	-13	-15	-17
Net lending						
- In EUR millions	-12	-60	-32	26	197	408
- In % of GDP	-0.01	-0.03	-0.02	0.0	0.04	0.08

TABLE 36 - Results relative to energy consumption and CO₂ emissions
(differences in % in relation to the base simulation)

	2002	2003	2004	2005	2007	2010
Final energy consumption						
- Total	-0.41	-0.84	-1.27	-1.35	-1.48	-1.55
- Industry	0.00	-0.03	-0.11	-0.26	-0.66	-1.17
- Transport	-0.62	-1.23	-1.85	-1.94	-2.03	-1.91
- Residential and tertiary	-0.65	-1.29	-1.89	-1.88	-1.77	-1.58
CO ₂ emissions						
- Total	-0.69	-1.49	-2.35	-2.66	-3.07	-3.41
- Energy production	-0.85	-1.79	-2.72	-2.98	-3.46	-4.13
- Industry	0.28	0.43	0.50	0.27	-0.15	-0.64
- Transport	-1.62	-3.51	-5.57	-6.34	-7.13	-7.34
- Residential and tertiary	-0.70	-1.33	-1.82	-1.62	-1.40	-0.75



Detailed results of Chapter V

A. Detailed results of a CO₂ levy, 'National Climate Plan' version

TABLE 37 - Main macro-economic results without redistribution of the additional tax revenue
(differences in % in relation to the base simulation, unless otherwise indicated)

	2002	2004	2006	2008	2010	2012
GDP and its components						
- Private consumption	-0.05	-0.17	-0.28	-0.39	-0.49	-0.49
- Gross fixed capital formation	-0.10	-0.43	-0.79	-1.16	-1.45	-1.55
. Firms	-0.14	-0.61	-1.15	-1.69	-2.16	-2.39
- Total domestic demand	-0.05	-0.20	-0.36	-0.51	-0.64	-0.66
- Exports	-0.01	-0.04	-0.08	-0.11	-0.14	-0.14
- Imports	-0.04	-0.16	-0.30	-0.42	-0.52	-0.54
- GDP	-0.02	-0.08	-0.12	-0.15	-0.17	-0.14
Prices and costs						
- Consumption prices	0.07	0.22	0.36	0.49	0.62	0.60
- Health index	0.03	0.11	0.19	0.26	0.32	0.31
- Exports	0.02	0.07	0.11	0.15	0.17	0.16
- Imports	0.00	0.01	0.02	0.03	0.03	0.03
- Terms of trade	0.02	0.06	0.09	0.12	0.14	0.13
- GDP deflator	0.06	0.22	0.36	0.49	0.60	0.58
- Real hourly wage	-0.04	-0.10	-0.16	-0.21	-0.26	-0.25
- Unit labour cost	0.05	0.18	0.30	0.39	0.46	0.41
Employment						
- Differences in %	-0.03	-0.10	-0.15	-0.20	-0.26	-0.26
- Differences in thousands	-1.28	-3.93	-6.24	-8.57	-10.96	-11.23
- Labour productivity/hour (market sector)	-0.03	-0.08	-0.13	-0.15	-0.16	-0.12
Income						
- Households' real disposable income	-0.04	-0.18	-0.29	-0.41	-0.52	-0.52
- Households' saving rate (differences in level)	0.00	-0.00	-0.01	-0.02	-0.03	-0.03
- Firms' gross operating surplus (differences in % of GDP)	-0.03	-0.09	-0.14	-0.18	-0.21	-0.19
Balance of current transactions with the rest of the world						
- Differences in EUR billions	0.12	0.49	0.97	1.54	2.17	2.52
- Differences in % of GDP	0.04	0.16	0.29	0.42	0.54	0.57

TABLE 38 - Main sectoral results without redistribution of the additional tax revenue
(differences in % in relation to the base simulation)

	2002	2004	2006	2008	2010	2012
Output						
- Agriculture	-0.07	-0.21	-0.32	-0.43	-0.53	-0.49
- Energy	-0.13	-0.48	-0.85	-1.25	-1.64	-1.76
- Manufacturing	-0.06	-0.20	-0.33	-0.43	-0.52	-0.50
. Intermediate goods	-0.04	-0.17	-0.28	-0.38	-0.46	-0.46
. Equipment goods	-0.08	-0.28	-0.48	-0.64	-0.76	-0.77
. Consumption goods	-0.06	-0.18	-0.26	-0.32	-0.37	-0.32
- Construction	-0.08	-0.25	-0.38	-0.50	-0.57	-0.51
- Transports and communication	-0.06	-0.19	-0.29	-0.39	-0.46	-0.43
- Retail, hotel and catering	-0.06	-0.19	-0.32	-0.43	-0.52	-0.51
- Credit and insurance	-0.05	-0.17	-0.30	-0.43	-0.56	-0.59
- Health care	-0.05	-0.11	-0.17	-0.23	-0.27	-0.26
- Other market services	-0.07	-0.20	-0.30	-0.40	-0.48	-0.44
Employment						
- Agriculture	-0.02	-0.08	-0.16	-0.24	-0.34	-0.39
- Energy	-0.07	-0.35	-0.74	-1.24	-1.84	-2.34
- Manufacturing	-0.02	-0.02	0.02	0.06	0.06	0.07
. Intermediate goods	0.02	0.17	0.45	0.71	0.94	1.09
. Equipment goods	-0.02	-0.09	-0.17	-0.26	-0.35	-0.40
. Consumption goods	-0.04	-0.12	-0.17	-0.24	-0.34	-0.39
- Construction	-0.08	-0.26	-0.40	-0.53	-0.63	-0.58
- Transports and communication	-0.05	-0.16	-0.27	-0.37	-0.46	-0.46
- Retail, hotel and catering	-0.03	-0.11	-0.19	-0.28	-0.37	-0.41
- Credit and insurance	-0.03	-0.11	-0.22	-0.33	-0.43	-0.47
- Health care	-0.04	-0.09	-0.14	-0.19	-0.23	-0.21
- Other market services	-0.06	-0.18	-0.26	-0.34	-0.41	-0.40

TABLE 39 - Results for public finances without redistribution of the additional tax revenue
(differences in EUR millions in relation to the base simulation)

	2002	2004	2006	2008	2010	2012
Current revenue, of which	192	589	1034	1501	2017	2136
- Direct taxation	-5	-41	-77	-116	-156	-173
- Indirect taxation	196	619	1085	1582	2132	2272
of which excise duty	191	598	1043	1517	2041	2166
- Social security contributions	-0	8	19	25	26	21
Current expenditure, of which	54	211	327	405	436	288
- Government consumption	19	87	165	249	341	379
- Social security transfers	21	75	131	189	250	265
- Interest payments	9	32	-2	-81	-219	-423
Balance of current revenue and expenditure	137	378	706	1096	1581	1848
Balance of capital revenue and expenditure	0	0	-1	-3	-6	-10
Net lending						
- In EUR millions	137	378	706	1094	1575	1838
- In % of GDP	0.05	0.13	0.21	0.30	0.39	0.41

TABLE 40 - Results relative to energy consumption and CO₂ emissions
(differences in % in relation to the base simulation, unless otherwise indicated)

	2002	2004	2006	2008	2010	2012
Final energy consumption						
- Total	-0.35	-1.09	-1.86	-2.64	-3.46	-3.77
- Industry	-0.57	-1.66	-2.92	-4.28	-5.77	-6.62
- Transport	-0.13	-0.41	-0.66	-0.90	-1.15	-1.19
- Residential and tertiary	-0.30	-1.02	-1.73	-2.41	-3.10	-3.25
CO ₂ emissions						
- Total	-0.41	-1.33	-2.48	-3.84	-5.23	-5.64
- Energy production	0.05	-0.48	-1.94	-4.49	-6.85	-7.34
- Industry	-1.03	-2.73	-4.51	-6.23	-8.24	-9.20
- Transport	-0.18	-0.63	-1.16	-1.72	-2.33	-2.56
- Residential and tertiary	-0.34	-1.21	-2.07	-2.87	-3.68	-3.89
CO ₂ emissions (differences in millions of tonnes)						
- Total	118.4	118.7	118.3	117.2	116.7	118.2
- Energy production	28.9	28.9	28.6	28.1	27.9	28.9
- Industry	33.6	32.4	30.9	28.9	27.3	26.0
- Transport	25.1	26.0	27.0	28.0	29.0	30.2
- Residential and tertiary	30.9	31.4	31.8	32.2	32.5	33.0

TABLE 41 - Main macro-economic results with redistribution of the additional tax revenue
(differences in % in relation to the base simulation, unless otherwise indicated)

	2002	2004	2006	2008	2010	2012
GDP and its components						
- Private consumption	-0.02	-0.06	-0.08	-0.10	-0.12	-0.10
- Gross fixed capital formation	-0.09	-0.36	-0.66	-0.93	-1.14	-1.18
. Firms	-0.13	-0.52	-1.00	-1.45	-1.83	-2.01
- Total domestic demand	-0.03	-0.12	-0.20	-0.28	-0.35	-0.35
- Exports	-0.00	-0.02	-0.03	-0.04	-0.05	-0.05
- Imports	-0.03	-0.13	-0.23	-0.31	-0.39	-0.39
- GDP	-0.00	-0.00	0.01	0.04	0.06	0.10
Prices and costs						
- Consumption prices	0.05	0.14	0.23	0.31	0.40	0.40
- Health index	0.01	0.03	0.05	0.08	0.10	0.11
- Exports	0.01	0.02	0.04	0.04	0.05	0.05
- Imports	0.00	0.00	0.00	-0.00	-0.00	-0.01
- Terms of trade	0.01	0.02	0.03	0.05	0.05	0.05
- GDP deflator	0.03	0.09	0.16	0.21	0.27	0.27
- Real hourly wage	-0.04	-0.10	-0.16	-0.21	-0.27	-0.26
- Unit labour cost	-0.09	-0.22	-0.32	-0.41	-0.49	-0.44
Employment						
- Differences in %	0.00	0.03	0.08	0.14	0.18	0.22
- Differences in thousands	0.05	1.29	3.42	5.72	7.85	9.47
- Labour productivity/hour (market sector)	-0.05	-0.16	-0.28	-0.38	-0.46	-0.45
Income						
- Households' real disposable income	-0.01	-0.05	-0.08	-0.10	-0.11	-0.10
- Households' saving rate (difference in level)	0.01	0.01	0.01	0.01	0.02	0.02
- Firms' gross operating surplus (differences in % of GDP)	0.01	0.01	0.01	0.00	-0.00	-0.01
Balance of current transactions with the rest of the world						
- Differences in EUR billions	0.09	0.36	0.74	1.16	1.63	1.91
- Differences in % of GDP	0.03	0.12	0.22	0.31	0.40	0.43

TABLE 42 - Main sectoral results with redistribution of the additional tax revenue
(differences in % in relation to the base simulation)

	2002	2004	2006	2008	2010	2012
Output						
- Agriculture	-0.05	-0.15	-0.23	-0.30	-0.37	-0.35
- Energy	-0.12	-0.44	-0.79	-1.15	-1.51	-1.62
- Manufacturing	-0.04	-0.12	-0.19	-0.24	-0.28	-0.26
. Intermediate goods	-0.03	-0.12	-0.19	-0.25	-0.30	-0.29
. Equipment goods	-0.06	-0.18	-0.30	-0.39	-0.46	-0.47
. Consumption goods	-0.04	-0.09	-0.10	-0.10	-0.10	-0.05
- Construction	-0.07	-0.18	-0.25	-0.28	-0.29	-0.19
- Transports and communication	-0.04	-0.11	-0.16	-0.20	-0.23	-0.20
- Retail, hotel and catering	-0.04	-0.10	-0.15	-0.20	-0.23	-0.22
- Credit and insurance	-0.03	-0.10	-0.18	-0.25	-0.30	-0.31
- Health care	-0.02	-0.02	-0.02	-0.02	-0.01	0.01
- Other market services	-0.05	-0.13	-0.18	-0.21	-0.24	-0.19
Employment						
- Agriculture	-0.01	-0.04	-0.08	-0.12	-0.19	-0.22
- Energy	-0.06	-0.29	-0.56	-0.88	-1.27	-1.57
- Manufacturing	-0.00	0.06	0.19	0.34	0.47	0.58
. Intermediate goods	0.02	0.22	0.56	0.93	1.25	1.50
. Equipment goods	-0.01	-0.02	0.00	0.04	0.10	0.18
. Consumption goods	-0.02	-0.02	0.04	0.09	0.13	0.16
- Construction	-0.01	-0.03	-0.03	-0.00	0.04	0.11
- Transports and communication	0.02	0.06	0.09	0.12	0.15	0.15
- Retail, hotel and catering	-0.00	0.01	0.04	0.08	0.10	0.12
- Credit and insurance	0.03	0.08	0.12	0.16	0.19	0.16
- Health care	0.01	0.08	0.16	0.25	0.34	0.39
- Other market services	0.00	0.05	0.11	0.17	0.23	0.28

TABLE 43 - Results for public finances with redistribution of the additional tax revenue
(differences in EUR millions in relation to the base simulation)

	2002	2004	2006	2008	2010	2012
Current revenue, of which	30	94	188	310	464	568
- Direct taxation	27	69	123	193	281	322
- Indirect taxation	196	619	1086	1589	2149	2301
of which excise duty	191	599	1044	1518	2041	2165
- Social security contributions	-193	-596	-1026	-1478	-1976	-2065
Current expenditure, of which	27	104	170	230	298	300
- Government consumption	9	40	76	118	170	198
- Social security transfers	5	9	9	8	11	6
- Interest payments	10	44	66	77	79	55
Balance of current revenue and expenditure	3	-10	18	80	166	269
Balance of capital revenue and expenditure	1	2	3	2	-0	-4
Net lending						
- In EUR millions	4	-8	21	82	166	265
- In % of GDP	0.00	-0.00	0.00	0.02	0.03	0.05

TABLE 44 - Results relative to energy consumption and CO₂ emissions
(differences in % in relation to the base simulation, unless otherwise indicated)

	2002	2004	2006	2008	2010	2012
Final energy consumption						
- Total	-0.35	-1.07	-1.83	-2.59	-3.39	-3.70
- Industry	-0.57	-1.66	-2.92	-4.28	-5.78	-6.63
- Transport	-0.14	-0.43	-0.69	-0.93	-1.19	-1.22
- Residential and tertiary	-0.28	-0.96	-1.63	-2.25	-2.89	-3.02
CO ₂ emissions						
- Total	-0.40	-1.29	-2.40	-3.72	-5.06	-5.45
- Energy production	0.06	-0.37	-1.70	-4.13	-6.38	-6.81
- Industry	-1.03	-2.74	-4.54	-6.28	-8.31	-9.28
- Transport	-0.18	-0.64	-1.16	-1.72	-2.31	-2.53
- Residential and tertiary	-0.32	-1.14	-1.94	-2.69	-3.44	-3.65
CO ₂ emissions (differences in millions of tonnes)						
- Total	118.4	118.7	118.4	117.3	116.9	118.4
- Energy production	28.9	28.9	28.7	28.2	28.0	29.0
- Industry	33.6	32.4	30.9	28.9	27.3	26.0
- Transport	25.1	26.0	27.0	28.0	29.0	30.2
- Residential and tertiary	30.9	31.4	31.8	32.2	32.6	33.1

B. Detailed results of a CO₂ levy, 'Tariff according to emissions trade' version

TABLE 45 - Main macro-economic results without redistribution of the additional tax revenue
(differences in % in relation to the base simulation, unless otherwise indicated)

	2002	2004	2006	2008	2010	2012
GDP and its components						
- Private consumption	-0.11	-0.37	-0.63	-0.85	-1.07	-1.06
- Gross fixed capital formation	-0.22	-0.93	-1.75	-2.48	-3.04	-3.20
. Firms	-0.32	-1.32	-2.52	-3.60	-4.53	-4.97
- Total domestic demand	-0.12	-0.44	-0.79	-1.10	-1.37	-1.40
- Exports	-0.01	-0.10	-0.18	-0.26	-0.31	-0.32
- Imports	-0.09	-0.36	-0.65	-0.91	-1.12	-1.15
- GDP	-0.05	-0.17	-0.26	-0.32	-0.36	-0.31
Prices and costs						
- Consumption prices	0.15	0.47	0.80	1.09	1.35	1.32
- Health index	0.07	0.25	0.43	0.57	0.70	0.68
- Exports	0.05	0.15	0.24	0.32	0.38	0.36
- Imports	0.01	0.02	0.04	0.05	0.06	0.06
- Terms of trade	0.04	0.12	0.21	0.27	0.31	0.29
- GDP deflator	0.15	0.47	0.80	1.08	1.31	1.28
- Real hourly wage	-0.09	-0.22	-0.35	-0.46	-0.58	-0.55
- Unit labour cost	0.11	0.40	0.67	0.87	1.00	0.91
Employment						
- Differences in %	-0.07	-0.21	-0.34	-0.45	-0.56	-0.56
- Differences in thousands	-2.94	-8.57	-13.92	-18.73	-23.75	-24.28
- Labour productivity/hour (market sector)	-0.06	-0.18	-0.29	-0.34	-0.36	-0.26
Income						
- Households' real disposable income	-0.10	-0.39	-0.66	-0.90	-1.14	-1.13
- Households' saving rate (differences in level)	0.00	-0.01	-0.03	-0.04	-0.06	-0.07
- Firms' gross operating surplus (differences in % of GDP)	-0.07	-0.19	-0.30	-0.39	-0.46	-0.42
Balance of current transactions with the rest of the world						
- Differences in EUR billions	0.28	1.05	2.15	3.36	4.66	5.36
- Differences in % of GDP	0.10	0.34	0.63	0.90	1.15	1.20

TABLE 46 - Main sectoral results without redistribution of the additional tax revenue
(differences in % in relation to the base simulation)

	2002	2004	2006	2008	2010	2012
Output						
- Agriculture	-0.16	-0.46	-0.73	-0.95	-1.17	-1.09
- Energy	-0.29	-1.04	-1.89	-2.72	-3.52	-3.73
- Manufacturing	-0.14	-0.45	-0.73	-0.94	-1.12	-1.09
. Intermediate goods	-0.09	-0.37	-0.63	-0.84	-1.01	-0.99
. Equipment goods	-0.18	-0.61	-1.05	-1.37	-1.60	-1.62
. Consumption goods	-0.15	-0.40	-0.59	-0.71	-0.83	-0.74
- Construction	-0.18	-0.54	-0.85	-1.08	-1.24	-1.09
- Transports and communication	-0.13	-0.41	-0.66	-0.85	-1.00	-0.94
- Retail, hotel and catering	-0.13	-0.43	-0.71	-0.94	-1.14	-1.12
- Credit and insurance	-0.11	-0.38	-0.68	-0.95	-1.20	-1.27
- Health care	-0.11	-0.25	-0.39	-0.50	-0.60	-0.57
- Other market services	-0.16	-0.44	-0.68	-0.88	-1.04	-0.97
Employment						
- Agriculture	-0.04	-0.18	-0.35	-0.53	-0.74	-0.86
- Energy	-0.16	-0.78	-1.64	-2.70	-3.95	-4.96
- Manufacturing	-0.04	-0.03	0.06	0.13	0.13	0.15
. Intermediate goods	0.04	0.39	0.98	1.56	2.02	2.32
. Equipment goods	-0.04	-0.19	-0.38	-0.56	-0.75	-0.84
. Consumption goods	-0.09	-0.25	-0.38	-0.52	-0.72	-0.82
- Construction	-0.17	-0.55	-0.90	-1.16	-1.36	-1.24
- Transports and communication	-0.11	-0.36	-0.61	-0.82	-1.00	-1.01
- Retail, hotel and catering	-0.07	-0.24	-0.43	-0.62	-0.81	-0.88
- Credit and insurance	-0.07	-0.25	-0.49	-0.72	-0.94	-1.02
- Health care	-0.09	-0.21	-0.32	-0.41	-0.49	-0.46
- Other market services	-0.14	-0.38	-0.59	-0.75	-0.89	-0.86

TABLE 47 - Results for public finances without redistribution of the additional tax revenue
(differences in EUR millions in relation to the base simulation)

	2002	2004	2006	2008	2010	2012
Current revenue, of which	433	1287	2303	3331	4441	4694
- Direct taxation	-13	-94	-175	-256	-342	-377
- Indirect taxation	445	1353	2422	3509	4693	4988
of which excise duty	433	1308	2330	3365	4490	4751
- Social security contributions	-1	19	41	55	58	49
Current expenditure, of which	122	458	729	884	930	595
- Government consumption	43	192	369	551	746	826
- Transfers to households	47	164	291	414	543	575
- Interest payments	20	63	-4	-186	-499	-953
Balance of current revenue and expenditure	311	829	1575	2447	3511	4099
Balance of capital revenue and expenditure	0	0	-1	-6	-14	-22
Net lending						
- In EUR millions	312	829	1573	2442	3497	4077
- In % of GDP	0.11	0.27	0.47	0.66	0.86	0.91

TABLE 48 - Results relative to energy consumption and CO₂ emissions
(differences in % in relation to the base simulation)

	2002	2004	2006	2008	2010	2012
Final energy consumption						
- Total	-0.76	-2.22	-3.82	-5.36	-6.90	-7.50
- Industry	-1.23	-3.28	-5.68	-8.14	-10.74	-12.36
- Transport	-0.28	-0.87	-1.49	-2.08	-2.67	-2.76
- Residential and tertiary	-0.64	-2.16	-3.76	-5.22	-6.62	-6.86
CO ₂ emissions						
- Total	-0.89	-2.77	-5.05	-7.32	-9.72	-10.43
- Energy production	0.09	-1.34	-4.09	-7.59	-11.42	-12.15
- Industry	-2.22	-5.31	-8.62	-11.59	-14.97	-16.79
- Transport	-0.40	-1.39	-2.58	-3.81	-5.09	-5.57
- Residential and tertiary	-0.73	-2.56	-4.43	-6.11	-7.66	-7.95
CO ₂ emissions (differences in millions of tonnes)						
- Total	117.8	116.9	115.2	112.9	111.1	112.2
- Energy production	28.9	28.6	28.0	27.2	26.5	27.4
- Industry	33.2	31.5	29.6	27.2	25.3	23.9
- Transport	25.0	25.8	26.6	27.4	28.2	29.3
- Residential and tertiary	30.8	30.9	31.0	31.1	31.1	31.7

TABLE 49 - Main macro-economic results with redistribution of the additional tax revenue
(differences in % in relation to the base simulation, unless otherwise indicated)

	2002	2004	2006	2008	2010	2012
GDP and its components						
- Private consumption	-0.04	-0.13	-0.18	-0.22	-0.25	-0.21
- Gross fixed capital formation	-0.20	-0.77	-1.41	-1.96	-2.35	-2.37
. Firms	-0.29	-1.14	-2.17	-3.06	-3.81	-4.11
- Total domestic demand	-0.07	-0.25	-0.44	-0.59	-0.71	-0.70
- Exports	-0.00	-0.04	-0.07	-0.09	-0.11	-0.11
- Imports	-0.07	-0.28	-0.50	-0.68	-0.82	-0.82
- GDP	-0.01	-0.00	0.03	0.09	0.15	0.22
Prices and costs						
- Consumption prices	0.11	0.30	0.50	0.68	0.87	0.87
- Health index	0.02	0.07	0.11	0.15	0.20	0.21
- Exports	0.02	0.05	0.08	0.09	0.11	0.10
- Imports	0.00	0.00	-0.00	-0.01	-0.02	-0.02
- Terms of trade	0.01	0.05	0.08	0.10	0.12	0.12
- GDP deflator	0.07	0.21	0.34	0.46	0.58	0.58
- Real hourly wage	-0.08	-0.22	-0.35	-0.47	-0.59	-0.56
- Unit labour cost	-0.20	-0.49	-0.74	-0.93	-1.10	-0.98
Employment						
- Differences in %	0.00	0.07	0.19	0.32	0.43	0.51
- Differences in thousands	0.10	2.95	7.90	13.25	18.16	21.76
- Labour productivity/hour (market sector)	-0.11	-0.36	-0.62	-0.84	-1.02	-1.01
Income						
- Households' real disposable income	-0.03	-0.12	-0.17	-0.20	-0.23	-0.19
- Households' saving rate (differences in level)	0.01	0.01	0.02	0.03	0.04	0.04
- Firms' gross operating surplus (differences in % of GDP)	0.02	0.02	0.02	0.01	0.00	-0.02
Balance of current transactions with the rest of the world						
- Differences in EUR billions	0.20	0.78	1.61	2.51	3.47	4.00
- Differences in % of GDP	0.07	0.25	0.47	0.68	0.85	0.90

TABLE 50 - Main sectoral results with redistribution of the additional tax revenue
(differences in % in relation to the base simulation)

	2002	2004	2006	2008	2010	2012
Output						
- Agriculture	-0.12	-0.32	-0.50	-0.65	-0.82	-0.77
- Energy	-0.27	-0.96	-1.74	-2.50	-3.24	-3.43
- Manufacturing	-0.09	-0.26	-0.41	-0.50	-0.58	-0.55
. Intermediate goods	-0.07	-0.25	-0.42	-0.55	-0.65	-0.62
. Equipment goods	-0.13	-0.38	-0.64	-0.81	-0.94	-0.95
. Consumption goods	-0.09	-0.18	-0.21	-0.21	-0.22	-0.14
- Construction	-0.15	-0.38	-0.53	-0.60	-0.61	-0.37
- Transports and communication	-0.09	-0.24	-0.36	-0.43	-0.49	-0.42
- Retail, hotel and catering	-0.08	-0.23	-0.34	-0.42	-0.50	-0.46
- Credit and insurance	-0.07	-0.23	-0.39	-0.53	-0.64	-0.65
- Health care	-0.04	-0.04	-0.04	-0.03	-0.01	0.03
- Other market services	-0.12	-0.28	-0.39	-0.46	-0.52	-0.42
Employment						
- Agriculture	-0.02	-0.09	-0.17	-0.27	-0.41	-0.49
- Energy	-0.14	-0.63	-1.22	-1.90	-2.69	-3.27
- Manufacturing	-0.01	0.13	0.44	0.78	1.07	1.31
. Intermediate goods	0.05	0.48	1.25	2.05	2.75	3.27
. Equipment goods	-0.02	-0.03	0.01	0.12	0.26	0.46
. Consumption goods	-0.04	-0.03	0.09	0.23	0.32	0.40
- Construction	-0.03	-0.07	-0.05	0.02	0.12	0.29
- Transports and communication	0.05	0.14	0.22	0.29	0.36	0.36
- Retail, hotel and catering	-0.01	0.03	0.10	0.18	0.25	0.29
- Credit and insurance	0.06	0.17	0.28	0.37	0.44	0.37
- Health care	0.02	0.17	0.37	0.58	0.78	0.89
- Other market services	-0.00	0.11	0.26	0.41	0.54	0.63

TABLE 51 - Results for public finances with redistribution of the additional tax revenue
(differences in EUR millions in relation to the base simulation)

	2002	2004	2006	2008	2010	2012
Current revenue, of which	66	201	409	671	992	1226
- Direct taxation	61	149	275	431	623	714
- Indirect taxation	444	1352	2422	3516	4715	5038
of which excise duty	434	1309	2327	3357	4477	4738
- Social security contributions	-440	-1305	-2297	-3290	-4364	-4548
Current expenditure, of which	61	224	364	490	625	620
- Government consumption	21	87	165	252	359	418
- Transfers to households	11	18	14	7	8	-7
- Interest payments	22	96	143	171	175	120
Balance of current revenue and expenditure	5	-24	45	182	368	606
Balance of capital revenue and expenditure	2	5	7	4	-0	-9
Net lending						
- In EUR millions	8	-19	52	186	367	597
- In % of GDP	0.00	-0.01	0.01	0.04	0.07	0.11

TABLE 52 - Results relative to energy consumption and CO₂ emissions
(differences in % in relation to the base simulation, unless otherwise indicated)

	2002	2004	2006	2008	2010	2012
Final energy consumption						
- Total	-0.75	-2.18	-3.74	-5.24	-6.74	-7.31
- Industry	-1.23	-3.27	-5.66	-8.11	-10.70	-12.31
- Transport	-0.30	-0.91	-1.56	-2.15	-2.75	-2.82
- Residential and tertiary	-0.60	-2.03	-3.52	-4.87	-6.16	-6.37
CO ₂ emissions						
- Total	-0.86	-2.68	-4.86	-7.03	-9.34	-10.00
- Energy production	0.14	-1.09	-3.59	-6.84	-10.45	-11.06
- Industry	-2.22	-5.32	-8.64	-11.63	-15.00	-16.85
- Transport	-0.41	-1.40	-2.58	-3.79	-5.03	-5.47
- Residential and tertiary	-0.68	-2.41	-4.15	-5.71	-7.16	-7.42
CO ₂ emissions (differences in millions of tonnes)						
- Total	117.9	117.0	115.4	113.3	111.6	112.7
- Energy production	28.9	28.7	28.1	27.4	26.8	27.7
- Industry	33.2	31.5	29.6	27.2	25.3	23.8
- Transport	25.0	25.8	26.6	27.4	28.2	29.3
- Residential and tertiary	30.8	31.0	31.1	31.2	31.3	31.8



Detailed results of Chapter VI

A. Detailed results of scenario I

TABLE 53 - Main macro-economic results of scenario I
(differences in % in relation to the base simulation, unless otherwise indicated)

	2002	2004	2006	2008	2010	2012
GDP and its components						
- Private consumption	-0.01	-0.03	-0.05	-0.07	-0.09	-0.08
- Gross fixed capital formation	-0.02	-0.03	-0.03	-0.01	0.02	0.06
. Firms	-0.03	-0.06	-0.08	-0.09	-0.10	-0.08
- Total domestic demand	-0.01	-0.03	-0.03	-0.04	-0.03	-0.02
- Exports	-0.00	-0.00	-0.00	-0.00	-0.01	-0.01
- Imports	-0.01	-0.03	-0.05	-0.06	-0.06	-0.06
- GDP	-0.00	0.01	0.01	0.02	0.04	0.04
Prices and costs						
- Consumption prices	0.03	0.07	0.12	0.16	0.20	0.20
- Health index	0.00	-0.00	-0.00	0.00	0.01	0.01
- Exports	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
- Imports	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
- Terms of trade	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
- GDP deflator	0.01	0.03	0.06	0.08	0.10	0.10
- Real hourly wage	-0.02	-0.07	-0.11	-0.15	-0.19	-0.18
- Unit labour cost	-0.02	-0.05	-0.07	-0.08	-0.09	-0.08
Employment						
- Differences in %	0.00	0.00	0.01	0.02	0.03	0.04
- Differences in thousands	0.00	0.17	0.52	0.96	1.46	1.86
- Labour productivity/hour (market sector)	-0.01	-0.03	-0.05	-0.07	-0.08	-0.08
Income						
- Households' real disposable income	-0.01	-0.03	-0.05	-0.07	-0.08	-0.08
- Households' saving rate (differences in level)	0.00	0.00	0.00	0.00	0.00	0.00
- Firms' gross operating surplus (differences in % of GDP)	0.00	0.00	0.00	0.00	0.00	0.00
Balance of current transactions with the rest of the world						
- Differences in EUR billions	0.02	0.07	0.13	0.18	0.23	0.23
- Differences in % of GDP	0.01	0.02	0.04	0.05	0.05	0.05

TABLE 54 - Main sectoral results of scenario I
(differences in % in relation to the base simulation)

	2002	2004	2006	2008	2010	2012
Output						
- Agriculture	-0.01	-0.02	-0.02	-0.03	-0.04	-0.04
- Energy	-0.06	-0.17	-0.26	-0.33	-0.40	-0.38
- Manufacturing	-0.01	-0.02	-0.03	-0.04	-0.04	-0.03
. Intermediate goods	-0.01	-0.02	-0.03	-0.03	-0.04	-0.04
. Equipment goods	-0.02	-0.04	-0.05	-0.06	-0.06	-0.05
. Consumption goods	-0.01	-0.02	-0.02	-0.02	-0.02	-0.01
- Construction	-0.02	-0.03	-0.03	-0.02	0.01	0.05
- Transports and communication	-0.01	-0.01	-0.02	-0.03	-0.03	-0.02
- Retail, hotel and catering	-0.01	-0.02	-0.03	-0.04	-0.04	-0.03
- Credit and insurance	0.00	0.01	0.02	0.03	0.04	0.05
- Health care	-0.00	0.01	0.03	0.04	0.05	0.06
- Other market services	-0.01	-0.03	-0.04	-0.05	-0.05	-0.04
Employment						
- Agriculture	-0.00	-0.00	-0.00	-0.01	-0.01	-0.02
- Energy	-0.03	-0.14	-0.27	-0.41	-0.57	-0.68
- Manufacturing	-0.01	-0.01	-0.00	0.01	0.02	0.04
. Intermediate goods	-0.00	0.00	0.01	0.02	0.03	0.05
. Equipment goods	-0.01	-0.02	-0.01	-0.00	0.01	0.04
. Consumption goods	-0.01	-0.01	-0.01	0.00	0.02	0.04
- Construction	-0.01	-0.01	0.01	0.03	0.07	0.10
- Transports and communication	0.01	0.02	0.02	0.04	0.05	0.05
- Retail, hotel and catering	-0.00	0.00	0.01	0.01	0.02	0.02
- Credit and insurance	0.01	0.03	0.05	0.07	0.08	0.08
- Health care	0.00	0.03	0.06	0.08	0.11	0.12
- Other market services	-0.00	0.00	0.01	0.02	0.04	0.04

TABLE 55 - Results for public finances, scenario I
(differences in EUR millions in relation to the base simulation)

	2002	2004	2006	2008	2010	2012
Current revenue, of which	16	42	79	127	190	225
- Direct taxation	12	24	42	66	95	107
- Indirect taxation	57	176	307	449	601	634
of which excise duty	55	166	287	415	550	570
- Social security contributions	-53	-159	-272	-390	-511	-520
Current expenditure, of which	11	40	64	88	112	115
- Government consumption	3	15	29	46	67	80
- Transfers to households	2	3	4	4	7	8
- Transfers to firms	1	2	4	6	8	8
- Interest payments	5	19	25	29	25	13
Balance of current revenue and expenditure	5	2	15	39	78	111
Balance of capital revenue and expenditure	0	1	1	0	-1	-4
Net lending						
- In EUR millions	5	3	17	40	77	107
- In % of GDP	0.00	0.00	0.00	0.01	0.02	0.02

TABLE 56 - Results relative to energy consumption and CO₂ emissions, scenario I
(differences in % in relation to the base simulation)

	2002	2004	2006	2008	2010	2012
Final energy consumption						
- Total	-0.04	-0.11	-0.17	-0.23	-0.29	-0.28
- Industry	-0.00	-0.01	-0.02	-0.03	-0.04	-0.04
- Transport	-0.12	-0.35	-0.56	-0.76	-0.93	-0.91
- Residential and tertiary	-0.01	-0.02	-0.03	-0.03	-0.03	-0.02
CO ₂ emissions						
- Total	-0.07	-0.24	-0.44	-0.64	-0.84	-0.90
- Energy production	0.02	0.03	0.04	0.04	0.04	0.01
- Industry	-0.00	-0.02	-0.03	-0.04	-0.05	-0.05
- Transport	-0.33	-1.07	-1.85	-2.61	-3.34	-3.48
- Residential and tertiary	-0.03	-0.06	-0.08	-0.10	-0.12	-0.10

B. Detailed results of scenario II

TABLE 57 - Main macro-economic results of scenario II
(differences in % in relation to the base simulation, unless otherwise indicated)

	2002	2004	2006	2008	2010	2012
GDP and its components						
- Private consumption	-0.01	-0.04	-0.07	-0.10	-0.12	-0.11
- Gross fixed capital formation	0.03	0.08	0.14	0.21	0.27	0.29
. Firms	0.03	0.10	0.16	0.22	0.27	0.26
- Total domestic demand	-0.00	-0.00	-0.00	0.01	0.01	0.02
- Exports	-0.00	-0.00	-0.01	-0.01	-0.01	-0.01
- Imports	-0.01	-0.02	-0.03	-0.03	-0.04	-0.03
- GDP	0.00	0.01	0.02	0.03	0.04	0.05
Prices and costs						
- Consumption prices	0.03	0.08	0.13	0.18	0.22	0.22
- Health index	0.00	0.01	0.01	0.02	0.03	0.03
- Exports	0.00	0.00	0.00	0.00	0.01	0.01
- Imports	-0.00	0.00	0.00	0.00	0.00	0.00
- Terms of trade	0.00	0.00	0.00	0.00	0.00	0.01
- GDP deflator	0.02	0.04	0.07	0.10	0.13	0.13
- Real hourly wage	-0.03	-0.07	-0.12	-0.16	-0.20	-0.19
- Unit labour cost	-0.01	-0.02	-0.02	-0.03	-0.03	-0.02
Employment						
- Differences in %	-0.00	0.00	0.01	0.01	0.02	0.03
- Differences in thousands	-0.01	0.09	0.29	0.58	0.88	1.16
- Labour productivity/hour (market sector)	-0.01	-0.02	-0.04	-0.05	-0.06	-0.06
Income						
- Households' real disposable income	-0.01	-0.04	-0.07	-0.09	-0.12	-0.11
- Households' saving rate (differences in level)	0.00	0.00	0.00	0.00	0.00	0.00
- Firms' gross operating surplus (differences in % of GDP)	-0.00	-0.00	-0.01	-0.01	-0.01	-0.01
Balance of current transactions with the rest of the world						
- Differences in EUR billions	0.01	0.04	0.07	0.09	0.12	0.12
- Differences in % of GDP	0.00	0.01	0.02	0.02	0.02	0.02

TABLE 58 - Main sectoral results of scenario II
(differences in % in relation to the base simulation)

	2002	2004	2006	2008	2010	2012
Output						
- Agriculture	-0.01	-0.02	-0.03	-0.04	-0.05	-0.05
- Energy	-0.06	-0.16	-0.25	-0.33	-0.40	-0.38
- Manufacturing	-0.01	-0.01	-0.02	-0.02	-0.02	-0.02
. Intermediate goods	-0.01	-0.02	-0.02	-0.03	-0.04	-0.04
. Equipment goods	-0.00	0.00	0.01	0.02	0.02	0.02
. Consumption goods	-0.01	-0.02	-0.03	-0.03	-0.04	-0.03
- Construction	0.00	0.02	0.05	0.09	0.13	0.16
- Transports and communication	-0.00	-0.01	-0.02	-0.02	-0.03	-0.02
- Retail, hotel and catering	-0.01	-0.03	-0.04	-0.05	-0.06	-0.05
- Credit and insurance	0.00	0.01	0.01	0.02	0.02	0.03
- Health care	-0.00	0.01	0.02	0.03	0.04	0.04
- Other market services	-0.01	-0.03	-0.04	-0.04	-0.05	-0.04
Employment						
- Agriculture	-0.00	-0.00	-0.01	-0.02	-0.02	-0.03
- Energy	-0.03	-0.14	-0.27	-0.43	-0.59	-0.71
- Manufacturing	-0.00	-0.01	-0.01	0.00	0.01	0.02
. Intermediate goods	-0.00	-0.00	0.00	0.01	0.01	0.02
. Equipment goods	0.00	0.00	0.01	0.03	0.04	0.05
. Consumption goods	-0.01	-0.02	-0.02	-0.02	-0.02	-0.00
- Construction	0.01	0.04	0.07	0.12	0.17	0.19
- Transports and communication	0.00	0.01	0.01	0.01	0.02	0.02
- Retail, hotel and catering	-0.00	-0.01	-0.01	-0.01	-0.01	-0.01
- Credit and insurance	0.01	0.02	0.03	0.03	0.04	0.04
- Health care	0.00	0.02	0.04	0.05	0.07	0.08
- Other market services	-0.00	-0.00	0.00	0.01	0.01	0.02

TABLE 59 - Results for public finances, scenario II
(differences in EUR millions in relation to the base simulation)

	2002	2004	2006	2008	2010	2012
Current revenue, of which	37	104	182	271	372	404
- Direct taxation	10	17	28	41	58	63
- Indirect taxation	58	177	309	451	602	634
of which excise duty	55	166	287	415	549	570
- Social security contributions	-31	-92	-157	-225	-294	-299
Current expenditure, of which	13	53	91	127	164	176
- Government consumption	4	19	37	58	83	96
- Transfers to households	3	7	11	15	21	22
- Transfers to firms	1	3	5	7	9	9
- Interest payments	4	22	35	42	45	43
Balance of current revenue and expenditure	25	51	91	145	208	228
Balance of capital revenue and expenditure	-22	-65	-114	-166	-222	-232
Net lending						
- In EUR millions	3	-15	-23	-21	-14	-5
- In % of GDP	0.00	-0.01	-0.01	-0.01	-0.01	-0.01

TABLE 60 - Results relative to energy consumption and CO₂ emissions, scenario II
(differences in % in relation to the base simulation)

	2002	2004	2006	2008	2010	2012
Final energy consumption						
- Total	-0.04	-0.11	-0.17	-0.23	-0.29	-0.28
- Industry	-0.00	-0.01	-0.02	-0.02	-0.03	-0.03
- Transport	-0.12	-0.35	-0.56	-0.75	-0.93	-0.90
- Residential and tertiary	-0.01	-0.03	-0.04	-0.04	-0.05	-0.03
CO ₂ emissions						
- Total	-0.07	-0.24	-0.44	-0.64	-0.84	-0.90
- Energy production	0.02	0.03	0.03	0.03	0.02	-0.01
- Industry	-0.00	-0.01	-0.02	-0.03	-0.03	-0.03
- Transport	-0.33	-1.06	-1.84	-2.61	-3.33	-3.47
- Residential and tertiary	-0.03	-0.07	-0.09	-0.12	-0.13	-0.11